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THE
ESSEX NATURALIST:

BEING THE

Journal of the Essex Field Club,

EDITED BY

WILLIAM COLE, F.L.S., F.E.S.

Honorary Secretary.

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“Men that undertake only one district are much more likely to advance natural knowledge than those that grasp at more than they can possibly be acquainted with. Every kingdom, every province, should have its own Monographer.”—GILBERT WHITE, of Selborne.

“Diffused knowledge immortalizes itself.”—SIR JAMES MACINTOSH.

[The authors alone are responsible for the statements and opinions contained in their respective papers.]

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"Nature, the vicar of the almighty Lord."

CHAUCER.

"Nature alone is antique, and the oldest art a mushroom."

CARLYLE.

*"'Tis elder Scripture, writ by God's own hand,
Scripture authentic! uncorrupt by man."*

YOUNG.

*"Nature gives healthy children much; how much!
Wise education is a wise unfolding of this;
Often it unfolds itself better of its own accord."*

GOETHE.

*"What more felicitie can fall to creature
Than to enjoy delight with libertie,
And to be lord of all the works of Nature,
To raine in th' aire from earth to highest skie,
To feed on flowers and weeds of glorious feature."*

EDMUND SPENCER.

*"Such, said Adoam, are the sentiments of this sagacious people, who
have acquired wisdom only by the study of Nature."*

TELEMACHUS.

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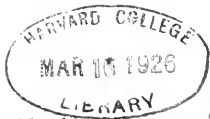
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ERRATA.

Owing to an unfortunate oversight in the printing office one half-sheet was not revised. The following errors should be corrected]:—

- Page 312 line 13 from top. for "One" read On
" 316 " 1 " " delete "is"
" " " 11 " bottom, for "relavant" read relevant
" 317 " 10 " " " "*Circurina curcurea* (Fabr.)," read
Cicurina cinerea (Panz)
" 318 " 1 " top " " ponds" read pond
" " " 2 " " " "*Gonatum rubens* (Blakw.) read *Nerione*
rubens (Blackw.)
" " " 6 " bottom, " " "(Clerk)" read Clerk
" 370 2 " " " " " "XII" read XIII

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The
Essex Naturalist:

received

BEING THE
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OF THE
ESSEX FIELD CLUB.

EDITED BY
WILLIAM COLE, F.L.S., F.E.S.,
Honorary Secretary and Curator.

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The authors alone are responsible for the statements and opinions contained in their respective papers.

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The Epping Forest Museum,
Queen Elizabeth's Lodge, Chingford, Essex.

Curator: W. COLE, F.L.S., F.E.S.

The Essex Field Club is intended to band together those taking an interest in Natural Science residing within or near the borders of ESSEX, as well as in LONDON, with the aim of creating and fostering a taste for the study of Nature in the field as well as in the study.

The PUBLICATIONS of the Club have gained general estimation, because of the care which has been taken to confine them to their original purpose, the record of investigations and elucidations of the NATURAL HISTORY (in its widest sense), the TOPOGRAPHY and PRE-HISTORIC ARCHÆOLOGY, of the COUNTY OF ESSEX. Since the foundation of the Club in 1880, over 4,500 pages of such material have been published, and a large proportion of the articles are of value to students residing outside the Club's limits.

1

THE
ESSEX NATURALIST:

BEING THE

Journal of the Essex Field Club

FOR 1899 AND 1900.

(VOLUME XI.)

BRITISH WELL-WORMS, (PHREORYCTES),
WITH ESPECIAL REFERENCE TO A
UNIQUE SPECIMEN FROM CHELMSFORD,
ESSEX.

By the Rev. HILDERIC FRIEND.

[Read February 25th, 1899.]

TOWARDS the end of 1895, Mr. Frank Beddard, M.A.,
Prosecutor to the Zoological Society of London, brought
out his magnificent *Monograph of the Oligochæta*. It was the only
attempt that has yet been made in England to bring our know-
ledge of earthworms and fresh water annelids up-to-date, and
may be regarded as the basis upon which all future work in this
department of biological research must rest. In this splendid
work we find several pages devoted to the study of a genus of
annelids known as "Well-worms," and the following sentence is,
for us, of peculiar interest. "The genus *Phreoryctes* has been
found in a good many parts of Europe (not in England) and in
New Zealand, and in North America." Thus we learn
definitely that in 1895 no species of Well-worm had been found
in this country, or at least that no species had been described as
native with us.

It now appears that there had been a solitary specimen of a
new species of *Phreoryctes* in my possession for three years
previous to the publication of the Monograph. Owing to the
scantiness of the material, however, and the fact that we had no
definite clue to the history of the worm, the remark of Mr.
Beddard has remained practically unaltered till the present time.

It is now my pleasure to be able to say that the words in brackets ("not in England") are henceforth to be deleted; and the honour of this belongs to Essex.

§ Historical.

Let me first give a history of the Well-worms themselves, then of the new species. The scientific name of the genus is derived from the Greek, in which language *Phcar* means a well, cistern, water tank, or fountain.¹ It was first employed by Hoffmeister. He had discovered a worm in Germany which had not previously been described, and applied to the new genus the name of *Haplotaxis*, a term which is derived from the Greek *haploos*, meaning simple, one-fold, simple, and *taxis*, order, rank, arrangement. This was in 1843. Hoffmeister afterwards discovered that the term *Haplotaxis* was already appropriated; the learned botanist, De Candolle, having employed it for a genus of the Order Compositae. He therefore compounded the word *Phrcoryctes*, which he employed in 1845. In 1854 another writer named Schlotthauber changed the name to *Gcoryctes*—earth-dweller—on the ground that it was occasionally found in the soil and was not exclusively a denizen of wells. That was, of course, an altogether improper change. Vaillant, however, pointed out sometime after that Claparède had ignorantly added to the synonymy by describing a worm found in the Rhone as *Nemodrilus*. This was found later to be a *Phrcoryctes*. It is no doubt desirable that we should avoid overlapping in nomenclature, and although it might be urged that there is no reason why *Haplotaxis* should not be used in Zoology as well as in botany, the term *Phrcoryctes* has become so fully established that it will be well to retain it in future rather than revive the earlier name.

§ Descriptive.

At this point it may be well to specify some of the characteristics of this very interesting group of worms. They are, with one exception, very long and thin, with red blood and sigmoid bristles or setæ. These are not cleft at the end as in some of the fresh water annelids. The number of setæ varies from two to four in each segment, and they are arranged singly, whereas in

¹ It should be noted that there are two other genera of well-worms which derive their names from this word, viz., *Phreatothrix*, of which one species has been found in wells on the Continent; and *Phreodrilus*, of which also one species has been found in wells in New Zealand. Thus we have in all three genera of well-worms at present known to science, containing seven species.

the earthworms they are usually in pairs. In some species the perfect seta has an imperfect one by its side, and the seta of the dorsal portion of the body usually vary from those of the ventral. Even in the species which has the normal arrangement of the setæ we still find a difference in size between the dorsal and ventral pairs. Several biologists have pointed out the existence here, as among the Enchytraeids, of a peculiar appendage to the ventral nerve cord in each segment. Normally there are two pairs of testes in segments ten and eleven, and two pairs of ovaries in the twelfth and thirteenth segments, as was first clearly indicated by Mr. F. E. Beddard. There are two or three pairs of spermathecae in the species already described. The prostomium is generally divided by a constriction. Mr. Beddard has described a closely related genus under the name of *Pelodrilus* the two genera being placed together under the Family Phreoryctidae. He gives the following definition of the Family:—

“DEFINITION. Aquatic or terrestrial Oligochaeta of slender form, often exceedingly long. Setæ in four rows of single setæ or paired, sigmoid. Testes in X., XI. Ovaries in XII., XIII. or XIV. only. Sperm-ducts, two pairs opening separately, without spermiducal glands. Spermathecae in front of testes, without diverticula. No genital setæ.”

In one or two particulars this definition will now require modification. In regard to the setæ we shall have to read in future—“Setæ in two or four rows,” and some qualification of the phrase about genital setæ must be introduced. Mr. Beddard next proceeds to define the genus *Phreoryctes*. First we have the synonyms as follows:—

Phreoryctes, Hoffmeister.

Haplotaxis, Hoffmeister.

Nemodrilus, Claparède.

Georyctes, Schlotthauber.

According to Dr. Michaelsen, whom I shall quote later, this synonymy is incomplete.

“DEFINITION.—Setæ in four rows of single setæ or pairs. Clitellum XI.—XIV. Prostomium divided by a transverse constriction. Testes in X., XI. Ovaries in XII., XIII. Vasa deferentia open separately on to XI and XII.; oviducts on to border line between segments XII/XIII. and XIII/XIV. Spermathecae, two or three pairs in VII., VIII. (IX.)”

Here again the same modification applies to the setæ. We now come to a consideration of the known species. When Mr.

Beddard prepared his *Monograph* he remarked that "the number of species of this genus is at least four; and they are all well characterized." This is a great gain. So clearly defined are the different species that, by means of the setæ alone we can determine at once under which head a given specimen should fall, and consequently can with equal ease determine whether or not a worm submitted for examination has been already described.

The first of the species to be described, if we follow Mr. Beddard's arrangement, was *Phrcoryctes menckanus*, Hoffm. The number of segments exceeds five hundred, the setæ are in four single rows, and the ventral setæ exceed the dorsal in length. Leydig, Vejdovsky, Giard, Timm, and others have written on this species.

Next in chronological order comes *Ph. filiformis*, Clap., which is about a quarter the length of its predecessor, and has the dorsal setæ longer than the ventral. The setæ, moreover, are shorter and much more hooked. Beddard calls attention to the difference of opinion which has prevailed among authors respecting these two species. He admits their possible identity, but emphasizes the fact that their length is widely different. Michaelsen seems disposed at present to place all the species under one. *Ph. menckanus* was described in 1843, *Ph. filiformis* in 1862.

Beddard added a third species in 1888 under the title *Ph. smithii*. This species comes from New Zealand, is a comparatively stout worm, has its setæ paired—which is the case in no other species—the dorsal setæ being longer than the ventral in the hinder segments. "The shaft of the setæ which is implanted in the body wall is curved, not straight as in the other species." It may be added that the worm was collected by Mr. W. W. Smith, "chiefly in fresh pools, where it lives in association with a species of *Limnodrilus*; one example was discovered in marshy soil; so that this species is equally at home in water and in damp soil."

The remaining species belongs to North America. It was described in 1890 by Mr. Forbes and bears the name *Ph. emissarius*. It is readily distinguishable from the rest by reason of the total disappearance of the dorsal setæ from four-fifths of the segments. The worm is six or eight inches in length, is composed of nearly 400 segments, very thin. The setæ are

implanted singly, in four rows for about 70 segments in front, and two ventral rows behind. This fact is peculiarly interesting in its bearing on the specimen from Chelmsford.

§ Significance of the foregoing facts.

It is important that we should understand the force of the facts which are gleaned by a study of the genus. To begin with the head. When I studied the Essex specimen one of the first things which struck me was the anomaly which presented itself here. Three of the known species of *Phreoryctes* have the prostomium or head segment divided into halves by a cross furrow at about the middle of its length: and the prostomium is rather elongated. This is a peculiar character, met with elsewhere, however, though not among the true Oligochæta. The setæ are instructive. Here, it is true, we meet with the utmost possible diversity. Mr. Beddard, who has let few things escape him, remarks that "the commencement of a diversity in the form of the setæ is seen in *Phreoryctes*, where some of the setæ are longer than the others, the dorsal longer than the ventral, or *vice versa*, or the posterior longer than the anterior." Moreover, while they are usually of the typical Lumbricid pattern, *viz.*, sigmoid or *f* shaped, and not cleft at the extremity, in one species the shaft is straight, in another they are varied on the girdle segments, and in two cases the dorsal setæ are either partially or entirely wanting. These are significant modifications. All departures from the type suggest one or two things, either they imply degeneracy or adaptation and progress. This genus is undoubtedly one of an advanced type in many ways.

I have shewn that the first name which Hoffmeister applied to the genus was *Haplotaxis*. Was the name chosen to set forth any genuine peculiarity, or was it merely haphazard? It was suggestive. It is the rule that aquatic annelids possess a longitudinal muscular layer composed of "flat flakes or lamellæ imbedded in a granular substance." This layer is absent from *Phreoryctes*—a fact which struck me when I examined the Essex worm, and one which I find I have recorded in my drawings made at the time when the worm was first placed in my hands. It was, doubtless, this fact which led Hoffmeister to give the name *Haplotaxis* to the genus. If we turn to the question of brain structure, we find that in *Phreoryctes* this organ has "the simple, bilobed character that is characteristic of the higher Oligochæta to which this worm is related." (Beddard, *Mono-*

graph, p. 19). Along with this we find also a remarkable specialization of the nerve-cord in some of the segments—a peculiarity which it shares with some of the Enchytraeids. Leydig and others have further pointed out the existence of valves in the dorsal blood vessel. While these appliances are general in the earthworms they are rarely found in the lower annelids, so that *Phreoryctes* in this respect is to be regarded as a highly important type. Mr. Beddard in 1895 accorded to the genus a position of great significance; and though Michaelsen has since reviewed the position, and my own discovery has yet to be considered, I cannot refrain from summarizing the findings of our greatest authority on this important subject.

The question which Mr. Beddard asks is:—"How far are we justified, with our present knowledge, in separating the aquatic from the terrestrial Oligochaeta?" His answer shows that in his judgment the genus under review forms in many respects a very decided connecting link between the two. "There are, undoubtedly, a certain number of points in which all these (aquatic) forms agree to differ from the terrestrial Oligochaeta. . . . And there are, furthermore, a few points which at present are peculiar to the aquatic Oligochaeta. We will commence with the latter. Among all the Oligochaeta which belong to Claparède's 'Limicolæ,' the ova are of large size and full of yolk; this holds good, without a single exception, from the smallest Enchytraeid up to so large a form as *Phreoryctes*. . . . The remaining point of difference concerns the structure of the body wall. The longitudinal fibres consist of a single row of deep fibres only (in the Limicolæ or aquatic forms); this, however, does not characterize *Phreoryctes*, a genus which in other characters occupies an intermediate position." Mr. Beddard proceeds to examine the large and instructive group of worms known as Enchytraeids, and adds—"The Enchytraeidæ perhaps resemble *Phreoryctes* more than any other group of the higher Oligochaeta; these resemblances, however, are not numerous, and are confined to a few species. The most striking is the existence in various species of *Pachydritus* of the segmentally arranged lateral outgrowths of the nerve-cord; structures similar to these appear to occur in *Phreoryctes*. Besides *Phreoryctes*, the only Oligochaeta in which there are so few as four setæ per segment, implanted singly, is *Enchytraeus monochaetus*." It was this fact that led me to name the Essex worm *Dichaeta*, or the worm

with two setæ. Finally, after having considered one or two points connected with the reproductive system, into which I need not enter, Mr. Beddard concludes as follows:—"All arguments, therefore, appear to me to point to the conclusion that *Phreoryctes* is, in respect of its reproductive organs, the most primitive type. . . . There is no type, in fact, in my opinion, which has such good claims to occupy a low (*i.e.*, archaic or early) position among the Oligochæta as *Phreoryctes*. It will be remembered also that this genus is one which was placed by Lankester in a position intermediate between the 'Limicolæ' (or aquatic worms) and the 'Terricolæ' (or earthworms) of Claparède; and it does, undoubtedly, combine the characters of these two groups. It is also a form which, as regards habitat, is on the border line between the two divisions; it lives both in the water and on the land. I look upon *Phreoryctes* as representing more than any other existing form, the common type whence the Megadrili (Earthworms or Terricolæ) and the Microdrili (Waterworms, aquatic annelids, or Limicolæ) have been derived."

Should further investigation confirm this judgment we see at once how valuable is the discovery in Great Britain of a new species of this curious and interesting genus.

§ Michaelsen's Researches.

In 1898, Dr. Michaelsen, of Hamburg, published in the *Zoologischen Jahrbüchern* a valuable article entitled "Beiträge zur Kenntniss der Oligochæten," the first part of which (pp. 105-118) is devoted to a study of "*Phreoryctes gordioides* (Hartmann), und seine synonymie." He calls attention to the fact that in the early part of this century Hartmann gave some account of a worm which he called *Lumbricus gordioides*, and which had previously been confused with *Gordius*. After various historical allusions the author adds:—

"Zu *Phreoryctes gordioides* muss ferner de von dem irischen Gelehrten Rev. H. Friend aufgestellte Art *Dichæta curvisetosa* (Friend on 'The Scientific Study of Worms' in the THE NATURALIST, 1896, p. 79) gezogen werden. So spärlich die Angaben über diese Art sind—dem Autor derselben lag nur ein einziges, jugendliches Exemplar vor—so lassen sie doch die *Phreoryctes* Natur des Wurms erkennen. 'The worm—which is aquatic in habit—is about four inches in length, and composed of some 250 segments, the first of which, like all the rest, contained two setæ only. Modified setæ occur on segments 11 to 14; the head (prostomium) is long and narrow, and the brain ganglion apparently circular in front.' Auch der Speciesname '*curvisetosa*'

deutet auf die am Ende sichel förmig gebogenen Jugend-Borsten des *Phricorytes* hin. Vor allem ist es die weiter unten näher zu erörternde Angabe, dass die Borsten schon mit dem 1 Segment beginnen sollen, die jeden zweifel über die Zugehörigkeit des betreffenden Stückes zu *P. gordioides* ausschliesst."²

A little later (p. 109) in speaking of the specialized setæ, Michaelsen continues:—

“Jenes Exemplar, zeigt zugleich, dass jener sprunghafte Borstenwechsel nicht in der ganzen Körperlänge zu gleicher Zeit eintritt, und bietet in so fern auch eine Erklärung für die Angabe Friend's, dass bei *Dichaeta curvisetosa* die Borsten der Segmente 11 bis 14 modificirt sein sollen”³

The foregoing quotations are sufficient for my purpose and I have to thank Dr. Michaelsen for having made it possible for me to give my worm its true position. I cannot, however, agree with him that the species now under review is to be identified with those which have been previously described.

§ The Essex Well Worm.

Six years and a half ago I received the following letter:—

CHELMSFORD,

4th November, 1892.

MY DEAR SIR,

I enclose in a bottle with glycerine a worm I received from a patient, who had taken it from his well. It was then, and until a few days ago, extremely active in its movements, and very difficult to examine. What I saw was so different from any I had seen before that I thought it might be of interest to you, and placed it in glycerine so as to preserve it as much as possible in a natural state.

Believe me, dear Sir,

Yours faithfully,

DANIEL WHEELER.

Attached to the bottle was a label bearing the following particulars:—“Worm found in a well at Chelmsford, Oct., 1892, Remarkably active when alive a few days ago. As soon as dead put in glycerine.”

I at once examined the worm, which was entirely new to me, and different in every important detail from all the aquatic

² TRANSLATION:—The species which Mr. Friend has recently described (NATURALIST, 1896), under the name of *Dichaeta curvisetosa* must also be referred to *Phricorytes*. Owing to the fact that the author himself had but one specimen, and that not adult, the description is very inadequate. In spite of this, however, the *Phricorytes* nature of the worm can be discovered. The specific name *curvisetosa*, moreover, sets forth the characteristic sickle-shaped form of the setæ in *Phricorytes*, while a further confirmation of the identity is furnished by the statement that they commence on the first segment—a point which finally settles its relationship to *P. gordioides*.

³ EXPLANATION:—Michaelsen refers to a fact which he has been elucidating. This, he says, may also be taken as throwing light on my statement that the setæ on segments 11–14 differ from those on the rest of the body.

worms which had then been described as British. As I hesitated to found a new species or genus on a solitary specimen, however well marked it might be, I wrote to Dr. Wheeler thanking him for the steps he had taken, and urging him to try and secure duplicates. His reply was as follows:—

CHELMSFORD,

21th November, 1892

MY DEAR SIR,

Please accept my thanks for your letter respecting the interesting worm I sent you. I at once communicated the interest you took in the matter, and he (the patient) has promised that he will, as soon as he sees another, let me have it. I have advised him to proceed to get some out of the well, as you suggest there are more there. I should have written before, but hoped another worm might have been procured.

When alive it was extremely active in its movements, and appeared unusually pointed at both extremities, which it moved so much alike that for a time I could not discover which was its head. It appeared very long in proportion to its thickness. With thanks for your information, and hoping I may before long be able to get more for you,

Believe me, yours faithfully,

DANIEL WHEELER.

I regret to say that from that day to this I have failed to secure a duplicate, though it is certain that others must often have been observed. With a view to securing interest in the matter I sent a note to the Editor of the *ESSEX NATURALIST* in December, 1892,¹ and later in 1895 a brief description under the name "*Dichata curvisetosa*, Nov. sp. et Gen.,"² and also in *THE NATURALIST*. The principal details have already been given, but as the worm is now clearly a member of a genus already described the name must be corrected. I shall give a full description in a later issue of the *ESSEX NATURALIST*, and trust that in the meanwhile the readers will make efforts to secure me more material. Worms found in wells may at once be transferred to glycerine, but it is preferable to send them alive in a small bottle with water to the Editor or direct to the Rev. Hilderic Friend, Ocker Hill, Tipton, Staffordshire.

¹ *ESSEX NATURALIST*, vol. vi., p. 18) (1892).

² "Notes on *ESSEX* Worms (Oligochaeta). Description of a species new to Britain (*Henlea ventriculosa*, D'Udekem) and of a genus and species new to science (*Dichata curvisetosa*, Friend), both from Essex." *ESSEX NATURALIST*, vol. ix., pp. 110-111 (1896).

THE PROTECTION OF WILD BIRDS IN ESSEX.

AT this spring season of the year, when the time of the singing of birds is come," the attention of those interested in the preservation of our native fauna may again be usefully called to the important consolidated "Orders" of the Secretary of State, which now run in the County of Essex. We summarised these orders, and printed in full the various schedules accompanying them, in the *ESSEX NATURALIST* for April-June, 1897 (vol. x., pp. 133-136). As was there stated, the effect of these orders is to establish some of the largest protected areas in England.

- (1). In the first place, under the orders, *every kind of wild bird frequenting the open or public lands in the County* is absolutely protected between the 15th of March and the 15th of August (both days inclusive).
- (2). The *scheduled birds* are protected on *all lands, public or private*, between the dates mentioned.
- (3). Within the Metropolitan Police District, the *eggs* of birds mentioned in one of the schedules (see p. 134, vol. x., E.N.), are *absolutely protected whether found on public or private land*.
- (4). Within the Metropolitan Police District above mentioned, or within the parishes of Epping, Epping Upland, Theydon Bois, Theydon Garnon, and Lambourne, the birds mentioned in another of the schedules (*ante*, vol. x., p. 135), are protected between the 15th of August and the 15th of March following. These scheduled birds in this area are consequently absolutely protected *all the year round*.
- (5). The *Eggs of any Wild Birds* found on the foreshores of the coast and tidal inlets extending from Harwich Lighthouse to Shoeburyness are absolutely protected.

In addition to the above orders, absolute protection *all the year round*, is afforded to *all birds and their eggs* occurring in the Forest lands officially under the care of the Corporation of London.

And, finally, the owners of certain estates bordering the Forest have agreed, by joining Mr. E. N. Buxton's "Epping Forest Bird Protection League" (E.N. ix., pp. 49-51), to protect all the Owls and Hawks (excepting the Sparrow-hawk), the Magpie, Peewit, Heron, and the Kingfisher, within their lands, an area amounting in the whole, with the official forest, to about 20,000 acres.

As we have frequently pleaded, these Wild Bird Acts and Orders require drastic revision; the schedules in particular, are

confused and confusing. We hope to live to see *all* wild birds protected, but failing that logical outcome of the idea of protection, a step in the right direction would be made by scheduling those birds that are *outside* the pale of protection, not those that are within it. This is the right principle, and if it were adopted, the comprehension of and obedience to the law would be more wide-spread, while the legal enforcement of the orders would be greatly facilitated.

In continuation of the reports on the birds of Epping Forest and district given on former occasions (see E.N. vol. x., pp. 56-57, and pp. 276-7), Mr. Buxton has placed in our hands some letters from keepers and others sent to him in March last, which confirm the favourable impression of the effects of the protection now afforded to the birds there imparted by previous accounts. A few paragraphs from the letters may be quoted:—

Hawks.—The observers do not distinguish the species, but speak in general terms; they probably mean Kestrels. The keeper in Theydon district says, "two couple nest every year in the oaks in Thames Valley." Two other keepers in the Epping district report an increase; at Bishops Hall Estate the keeper reports a large increase; at Waltham the report is "plenty of hawks"; at Chingford an observer says that he has seen a few hawks, "about the same number that I used to see in old days." At Woodreddon two were seen. Sparrow-hawks breed in Knighton and Gaunts Wood, Theydon, and they have been noticed at Ilford and elsewhere.

Owls.—The opinion appears to be general that these are increasing. The Theydon keeper writes, "I frequently see them in the large hollies in Epping Thicks." From High Beach comes the report that they have "increased in the neighbourhood of Fairmead High Woods, and on Mr. Baring's estate. I have heard as many as four hooting at one time on two occasions. I saw a pair of large White Owls on Alms-House Plain in the day time."

Magpie.—There are but few notes of these. As Mr. Russell remarks, they are rarely seen on the forest, but are occasionally noticed at Wanstead, in Loughton Manor, at Bishops Hall, and more frequently at Warlies and Monkams, near Waltham. Mr. Colvin's keeper (Waltham), complains that there are "too many Magpies"! The keeper at Coppel Hall reports having seen four together in April. At Loughton "we have two or three Magpies, and I have not seen any [previously] for some years." Bishops Hall keeper reports "Magpies very scarce here; I saw two about fourteen days back."

Peewits.—Most of the letters report an increase. The observant Theydon keeper says that they appear more plentiful. "A large quantity of them as well as the 'Golden Plover' were on the meadow land between Theydon Bois and Epping all the early part of the winter." From Epping comes the report, "Peewits are very plentiful this way"; Bishops Hall, "Peewits are more numerous than formerly." At Loughton, "Peewits are most abundant."

Kingfisher.—The Epping keeper reports an increase. Mr. Buxton says that there are a fair number along the Roding. A pair bred at Knighton every year. The other reporters do not mention them.

Coots have, Mr. Russell remarks, after several years absence from the district, re-appeared at Wanstead and Birch Hall.

Carrion Crows are getting very destructive at Loughton and elsewhere. The observer at Chingford reports a few *Bull-finches* "which I hardly ever or never used to see in the old days."

The *Hérons* in Wanstead Park have done well, they have 57 nests, probably an exceptional number.

Nearly all the keepers speak well of the effect of the new orders. The Theydon keeper remarks:—"Bird catching by the professionals from London is practically extinct around my beat, as one is not seen now where twenty or thirty would be three or four years ago, the police being very smart on them." The keepers all commend the way in which the police are endeavouring to enforce the law, but at Waltham it is stated that "on Sunday the place is infested with bird catchers and youths frequent the lanes bordering the forest, ruthlessly destroying every nest they can find." At Loughton also the bird-catchers seem to be somewhat rampant, and efforts are needed to put a stop to the evil. The fines inflicted are far too small; greater rigour on the part of the magistrates would do much good in checking the incursions of the fraternity.

Our member, Mr. C. B. Russell, J.P., the energetic *Hon. Secretary* to the Essex Bird Society, has favoured us with an advance copy of his Report for 1898, which is accompanied by a map showing the specially protected areas in Essex, and we gladly print his interesting notes relating to the *Shore-birds* and *Wildfowl* which are the special objects of the vigilance of his excellent Society:—

"The year 1898 will be memorable for the effects of the disastrous high tides. Several gulleries were spoilt, as well as breeding grounds of wild duck all round the Essex coast; but on the other hand, large numbers of duck are reported as having bred inland. It is an ill wind that blows no one any good, and it seems probable that the islands and marshes lost to the farmer may again become havens of refuge to the wild fowl. Such is likely to be the case with Pewit Island, of which Fuller gives such a delightful account."

* * * * *

"The Inspectors were asked by a circular letter, (i) How the shore birds did last season? (ii) Whether, during the past few years, there has been any appreciable increase or decrease in the numbers of shore birds and wild fowl breeding with us? (iii.) Whether any damage was done to the breeding grounds by the floods last year?"

“The following details are extracted from letters received in answer to these queries:—

- A 1 ‘It was a very bad season for shore birds on account of very high tides.’
 2 ‘For the past three or four years they seem at a standstill—neither increase or decrease.’
 3 ‘The floods last year had a great deal to do with the scarcity of birds this year.’
- B 1 ‘The shore birds have increased in almost every case.’
 2 ‘While these have increased, the wild fowl have considerably decreased.’
 3. ‘The breeding grounds were much damaged by the high tide. Many of the eggs were destroyed, and on the enclosed marshes many of the young died for want of water, the ditches having been drained to clear them from the salt water.’
- C ‘The birds did well in regard to breeding, but on account of the great flood of salt water, after the birds were hatched, they got into the water, and it being salt water, they died. There was no fresh water for them for some time, as the salt water remained so long on the marshes.’
- D ‘I think on the whole a decrease in this district, and I think that the floods have been the means of stopping the breeding of wild fowl all around this locality, as they have been over-flowed several times last season.’
- E. ‘I think we had more Terns and Ring Plover breeding here this year; not quite so many ducks, as I think they went where they could get fresh water. I told you about the gulls. There was not one nest in my fleets, only a few, very late, in my neighbour’s fleet. They came at the usual time, found the fleets run dry after the flood of salt water— as we had very little rain they did not fill up again— so I suppose they did not like the look of it, and went away; then they came back again about a week into June. I found 22 nests on the saltings, with one and two eggs in, and they managed to hatch them off in between the big tides. So there was not a tenth part so many as usual, I believe through no other cause than the flood. I saw the first Ring Plover’s nest with two eggs, on May 13th; young Terns, some nearly feathered and some just hatched, on June 25th; on July 7th I found a Wild Duck sitting hard on the salting; we had the tide a foot deep in most places, and must have been three or four inches deep over the nest two days following. I think she hatched off all right, as I found the remains of the eggs after in the nest. They could not be fit to shoot by the 1st of August! I saw one nice brood of Wild Duck on May 1st.’
- F ‘As for the Wild Fowl, they are as scarce this winter as I ever knew them. From what I have understood, the floods and big tide affected the ground so that it killed a great many of the young ducks, and I think the close time ought to be the first of March till the first of September.’

- G. 'The flood has destroyed the Wild Ducks' breeding ground, but with other birds it has made no difference; last season was very fair with other shore birds.'
- H. 'Ducks and Coots plentiful at first. There have been more of some sorts that frequent this part. I can speak from being an eyewitness to seeing hundreds of young birds—Ducks and Coots—hatch where I was, and having no fresh water, they all perished; for after about one week there wasn't a young one to be seen, only dead ones, and as June came the old birds left, all but now and then one took their departure, and there are but few returned at present.'
- I. 'The shore birds did well last season, and there seems an increase of the same, but a decrease in Wild Fowl this season, owing largely, I believe, to the very high tides which prevailed all the summer, damaging the nests.'
- K. 'There was a fair quantity of shore birds last season. There has been a great decrease in Wild Fowl, through and owing to the great floods of last season. There are hundreds of Wild Fowl eggs destroyed by laying on the saltings. If they were disturbed when building their nests, they would go and build on the fresh marshes. As there are a lot of saltings in my district, that would be the means of preserving them.'
- L. 'I think the shore birds had a fair breeding time last year, and that there is an increase in all the small class. Wild Ducks are not nearly as plentiful as usual, but this is, I think, owing to the flooding of their breeding grounds by the sea breaking over last November year.'

"Another correspondent reports:—'A much larger number of Ring Plover; you can see them at any time; a year or two ago you could hardly see one. The island that Mr. Buxton and yourself went to look at has all gone to sea, and the birds have taken up their abode there, any amount of them, and all kinds, so it looks like the birds making their home there.' He also reports the breeding of Sheldrake and Oyster-catchers; and says that there has been a great increase in the number of Dab-chick."

"It seems probable that the young duck died in the flooded grounds rather from want of food than from want of fresh water. Any observations on this point would be of interest."

Mr. Russell reports that 16 persons were prosecuted under the Wild-bird Acts in Essex in 1898, and all but one were convicted. He also says that several suggestions have been made to him, and quotes the following as worthy of consideration by the County Council and the Home Secretary for adoption in Essex:—

- "1. That a list of birds should be drawn up to be protected all the year round throughout the county. Such a list would necessarily be confined to those which are both harmless and easily distinguished. It might include the Kingfisher, Woodpecker, Nut-hatch, the Swallow tribe, Goldfinch, Barn Owl, &c.

1. As above-mentioned, we would recommend that a list should be published of those birds not protected.—ED.

- " 2. That, as in Middlesex, Sundays should be close-time for taking birds. Such a bye-law would not apply in the case of owners and occupiers or their authorised agents.
- " 3. That a date should be fixed, after which it would be illegal to take plovers' eggs."

On the whole it may be claimed that the efforts made on behalf of our little feathered friends during the past year were successful—such disastrous natural effects as the flood of November, 1897, will not, it is to be hoped, recur—and with a little more co-operation on the part of the general public and a little wholesome draconian severity delivered from the Bench, lovers of birds in Essex may become more hopeful of the future.

THE PRESIDENTIAL ADDRESS.

DELIVERED AT THE NINETEENTH ANNUAL MEETING
ON MARCH 25th, 1899.

By DAVID HOWARD, J.P., F.C.S., F.I.C.

“*LIFE PROBLEMS IN MODERN SCIENCE.*”

[Abstract by Mr. Howard]

LADIES AND GENTLEMEN,

THE most important event which has marked the past year of the Essex Field Club has been the provision, through the generosity of Mr. Passmore Edwards (supplemented by the liberality of the West Ham Borough Council), of a suitable home for the collections of the Club, and arrangements for the permanent maintenance of the Museum. It is no small satisfaction that at last a solution has been arrived at of a question which has caused so much anxiety to the Council and all who have the welfare of the Club at heart, but it must not be forgotten that the acceptance of these provisions entails upon the Club the very serious responsibility of providing for the exhibition of their collections in a manner worthy of their new home. It is earnestly to be hoped that a liberal response will be made to the appeal for funds for this purpose.

Another event of good omen for the future has been the preliminary steps that have been taken to establish closer relations between the learned societies in East Anglia interested in like studies to our own. The need for united work in all scientific research and the evils of isolation in study are increasingly evident, and we heartily welcome this prospect of union with valued fellow-workers.

I will not venture to attempt a review of the general progress of science in the branches in which we are chiefly interested. It is more and more difficult to keep abreast with progress, even of one branch of knowledge, and yet at the same time the interdependence of the various branches of study becomes more and more fascinating, yet bewildering. It is not only difficult but impossible to define spheres of influence among the sciences either in their abstract study or in their practical applications. Perhaps in nothing is this interpenetration more marked than in the striking manner in which the phenomena of life, and still more of the interdependence of the higher and lower forms of life, complicate so many problems of modern scientific thought. In Chemistry, for example, the marvellous progress in the synthesis of organic compounds had seemed almost to do away with any distinction between the organic and the inorganic, but though these distinctions may seem obliterated as to the resultant compounds, our results are obtained by processes that throw little or no light on the natural life problem. We can synthesise alcohol from olefiant gas, and we can, by oxydation with spongy platinum, change this into acetic acid. In this we but clumsily imitate the processes which, under the influence of the living plant, synthesise starch from the gases of the air: then, by the inimitable action of germination, transform it into sugar; and then, by the obscure intervention of a foreign micro-organism, split it up (how we know not as yet) into alcohol and carbonic acid, ready for yet another organism to transform (for unknown reasons of its own) into acetic acid.

Again, our conception of organic chemistry has been revolutionised by the discovery firstly of the influence of the nitrifying micro-organisms in transforming and modifying the combined nitrogen of the soil, and still more of the semiparasitic organisms to which apparently the supply of combined nitrogen for higher plant life is largely due. It is impossible to over-estimate the importance of this and of other cases of symbiosis.

It is not alone a most fascinating study, throwing a flood of light on most obscure problems of vegetable physiology, but it is also of immense practical importance in the manuring of crops. It is, at least, possible that the mere unintelligent application of the constituents needed for plant life may in some cases do more harm than good by discouraging the efforts of these invaluable living auxiliaries.

As we get higher in the scale of life, the influence of lower forms becomes of even greater importance. In medicine, instead of being able, as we seemed to have the prospect of being, to regard the body a highly-developed chemical laboratory, the processes of which were more or less analogous to those known in the work-shop of the chemist, we find that health or sickness, life or death, depend to an undetermined degree on the life-history of micro-organisms, the very existence of which we did not guess a few years ago; it is the culture in the flask of the bacteriologist rather than the re-action in the test-tube of the chemist that tells the secret of disease and its cure. It is the foes within the human frame far more than the foes without that imperil it.

Time would fail to follow out the ramifications of this wide question. I will but remark on the fact that while we are thus constantly meeting fresh proofs of the all-prevailing influence of living organisms, we seem as far off as ever from learning what life is. It certainly is not organic in the sense of depending on the presence of organization; it is the living "protoplasm" that makes the organization, not the organization that makes the life, but how to express in terms that we can comprehend what is the real difference between living and dead matter is a problem as obscure as ever.

We do but learn the more we know how little we know and realize how much there is to learn, how much more to believe.

ANNUAL REPORT OF THE COUNCIL FOR THE YEAR ENDED DECEMBER 31st, 1898.

[Read and adopted at the 19th Annual Meeting held at Stratford, March 25th, 1899.]

FINANCE.—The accounts for 1898 are, in deference to the opinion of the Auditors, which has been endorsed by the Treasurer and Council, presented in a slightly different form as compared with those for 1897.

The debit balance on the General Account, largely reduced in 1897, has been again diminished by a small amount, although, as will be observed, £25 was allocated to the Essex Museum Maintenance Fund for the half year, in accordance with the recent agreement with the Corporation of West Ham. The loss on Field Meetings, though more than doubled, was compensated by a large reduction in the cost of circulars and stationery. As in 1897 the year's expenses may be said to be included in the year's accounts.

The Subscriptions in arrear on December 31st, amounted to rather more than £45, as compared with £25 in 1897.

The debit balance on the Special Memoirs Account has been increased by the sum of £10, which is represented by stock acquired and now saleable; that on the Forest Museum Fund (which now includes both Capital and Maintenance) has been reduced by over £5.

The life Composition Fund, included in the summary of Balances, has further benefited by the resolution of March 2nd, 1897, and will continue to do so.

MEMBERSHIP.—During the year 1898, the Club had cause to regret the loss, by death, of three ordinary members: Mr. J. Albert Copland, Lord Carlingford, and Dr. Maurice Davies. The losses by resignation amounted to twenty-seven, and two members were removed by order of the Council. Fifteen new members were elected. The strength of the Club on December 31st, 1898, was as follows:—Life Members, 28; Ordinary Members, 209; Ordinary Members (1893), 27; Honorary and Exempt Members, 21; making a total of 285.

THE CLUB'S LOCAL (COUNTY) MUSEUM.—In continuation of the reports on the position of the Club's Museum given in the last two Annual Reports of the Council (ESSEX NATURALIST vol. x. pp. 18-21 and pp. 251-252) the attention of members is drawn to the statement on the subject in a late part of the Journal (E.N. vol. x. pp. 337-346). Full particulars are there given of the negotiations and arrangements with the Corporation of West Ham, and the text of the agreement is set out in full. It is unnecessary to repeat these details on the present occasion. The agreement was signed by the Hon. Secretary on behalf of the Club, and signed and sealed by the Mayor and Town Clerk on behalf of the Corporation, on July 25th last. Under the terms of the agreement the Treasurer of the Club has to pay to a separate account to be called the "Museum Maintenance Fund" the sum of £50 annually, and in like manner the Corporation of West Ham have agreed to pay to the Treasurer of the Club for the purposes of the said Fund the sum

of £100 annually, these two payments to commence from the date of the agreement. The proportional instalments of the Annual Grants up to the 25th of December, 1898, have been paid to the Fund.

The necessary alterations in the Rules and the consent of the Club as a body to the terms of the agreement were made and given at a Special Meeting held on October 4th, 1898, which is fully reported in the last issue of the *ESSEX NATURALIST* (vol. x. pp. 406-407).

With reference to the removal of the Club's goods from Chelmsford and the differences on matters of finance which had arisen, a Sub-Committee (consisting of the Rev. R. E. Bartlett, Mr. T. V. Holmes, and Prof. R. Meldola, with Mr. W. C. Waller as Hon. Secretary) was formed "for the purpose (amongst other things) of reporting upon the best way of settling the said differences whether by friendly arrangement, arbitration or otherwise."

The separation of the Club's goods from those formerly belonging to the old Chelmsford Museum was made, and the Council decided that they should at once be removed from Chelmsford. This was done on September 2nd last. The question of the pecuniary liabilities attaching to each party was delegated to the above-named Committee, with the addition of Mr. C. A. Copland (Solicitor), on behalf of Mr. Chancellor, and Mr. Henry I. Coburn, Hon. Solicitor to the Club, "to act as Arbitrators in the financial question, their award to be final and binding on both the said Institutions." The award of the Arbitrators was made on January 17th, 1899, and in the following words (after recital):—

"And whereas Frederic Chancellor, of Chelmsford, aforesaid Architect (on behalf of the said Museum), and William Cole, of Knighton Villas, Buckhurst Hill (on behalf of the said Club), have each submitted to us certain statements of account and otherwise in reference to the said matter of difference embodying the claims of the said Institutions respectively the claim of the said Museum being in excess of the claim of the said Club. Now we the undersigned as such arbitrators as aforesaid having duly considered the said statements and the said matters in difference do hereby decide, award, and adjudge that all accounts between the said Institutions shall be considered as settled and closed without any payment being made by either of the said Institutions to the other, and that all claims by each of the said Institutions against the other in respect of the matters in difference or for damages or otherwise shall be considered to be put an end to and extinguished."

This award was signed by all the members of the Committee, and must be accepted as a final settlement.

The Council gave up possession of the rooms at Chelmsford on the 29th of September, and they have taken premises at 9, Woodgrange Road, Forest Gate, as a temporary storehouse and Curator's work-rooms pending the completion of the new museum.

Mr. W. Cole, F.L.S., F.E.S., has been appointed Curator to the Museum as from the 25th of July, 1898.

The Council and the members of Club have already recorded their most cordial thanks to Mr. Passmore Edwards for his munificence, and also to the Technical Instruction Committee of the Corporation of West Ham for the enlightened view they have taken with regard to the establishment of the Museum on a secure footing. The Council also wish to express their thanks

ESSEX MUSEUM (WEST HAM) EQUIPMENT FUND.

To Donations	£ s. d.	£ s. d.
Receipts.	150 7 6	150 7 6
By Balance at Lloyd's Bank, December 31st, 1898	...	...
Expenditure.	...	...

ESSEX MUSEUM (WEST HAM) MAINTENANCE FUND.

To General Account for Amount transferred in accordance with the Agreement dated July 25th, 1898	£ s. d.	£ s. d.
Receipts.	25 0 0	7 0 0
By Removal of Goods from Chelmsford	...	15 0
By Warehousing Goods	...	1 2 6
By Fire Insurance, Woodgrange Road	...	16 2 6
By Balance at Lloyd's Bank, December 31st, 1898	...	£25 0 0
Expenditure.	...	...

LIFE COMPOSITION ACCOUNT.

To Balance from 1897, being the amount due in respect of Life Compositions of existing Members	£ s. d.	£ s. d.
...	104 10 6	104 10 6
By Balance forward	...	...

21

Dr.

To Essex Museum—			
Equipment Fund	150 7 6	...	150 7 6
Maintenance Fund	16 2 6	...	16 2 6
Life Composition Account	166 10 0	...	28 13 2
...	104 10 6	...	2 4 8
By Cash at Lloyd's Bank—			
Essex Museum Equipment Fund	...	...	197 7 10
Essex Museum Maintenance Fund	...	...	6 5
Life Composition Fund	...	...	...
General Account	...	...	...
Cash in hands of Honorary Secretary	...	...	...
Deficiency—			
General Account	...	...	43 8 0
Special Memoirs and Publication Account	...	...	25 16 5
Epping Forest Museum Fund	...	...	4 1 10
...	...	...	73 6 3
£271 0 6			£271 0 6

Cr.

We have examined the above Accounts with the books and vouchers, and find the same correct.
18th February 1899.

WALTER CROUCH
JOHN D. COOPER.

Hobt. Auditors
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N.B. The Club possesses other Assets, consisting of Stock of Publications, Books, MSS., Copyrights, Specimens, Cabinets, etc

to Mr. H. I. Coburn for the great care and attention he has given, as Hon. Solicitor to the Club, to the legal and other arrangements in connection therewith; also to Mr. W. C. Dare, the Hon. Counsel, to whom the draft agreement was submitted for settlement. They also record thanks to the members of the Sub-Committee of Arbitration, and particularly to Mr. W. C. Waller for the labour he has bestowed in the matter in the office of Hon. Secretary to the Sub-Committee.

It would be premature to give now anything like a full report on the Museum. The Curator will in a few months' time draw up a report for presentation to a meeting of the Club, and will embody in it the main details of the proposed arrangement of the collections. This cannot be done usefully until the building is in a more advanced stage.

Some donations to the Museum should, however, be acknowledged at once. Mr. W. H. Dalton, F.G.S., has presented the whole of his valuable geological collections, and has moreover devoted a considerable time to the classification of the specimens and will continue to do so as opportunity offers; Mr. J. C. Shenstone has presented his Herbarium, consisting largely of Essex plants, which number about 700 specimens; the Rev. J. W. Kenworthy has presented specimens from the supposed Forest Bed at Clacton and has placed his Braintree collections of the remains of animals and flint implements, &c., on loan, to form a temporary exhibition of the works of Neolithic Man and his surroundings and animal contemporaries; Mrs. Bree has, through Dr. Laver, presented the collection of the bones of Pleistocene Mammalia from the North Sea, made by her husband, the late Dr. C. R. Bree, of Colchester. This collection has not yet been received, but will come into our possession very shortly. Other donations have been received or are promised, and will be recorded in the report to be presented as above indicated.

In accordance with the terms of the agreement, the Council have established a "Museum Purchase Fund" to raise the money required (estimated at £1,000) for the fitting up and equipments of the Museum. A full statement of this Fund has recently been placed in the hands of the members, and Council await the result, in the hope that the members of the Club and the public generally will support an institution which might be rendered one of great interest and educational value.

The Council cannot refrain from congratulating the Club on the fact that an Essex Museum of Natural History in the true sense of the term will soon be established. The Museum at first will probably fall far short of the wishes of the promoters, but the arrangements made will permit of its rapid growth and development; above all, the risk of decadence will be minimised, as the annual grant will permit of continuous work being carried on. In a few years time the County Museum will, it is confidently anticipated, be worthy of its name by containing sets of specimens fairly representative of the natural history of a most interesting district.

MEETINGS. — Eleven meetings were held during 1898, which were well and sometimes numerously attended. They have all been reported in full in our Journal and therefore but few remarks are necessary. As in former years it is our pleasing duty to acknowledge kind hospitalities. At the meeting on July 23rd, the Mayor of Colchester, Mr. Alderman J. N. Paxman, entertained the Club at his beautiful seat, Stisted Hall, and on October 1st the Vicar of

Braintree and Mrs. Kenworthy welcomed the members to tea, after the very pleasant and instructive meeting at Braintree. On October 8th a Joint Meeting with the Essex Archæological Society was held at the Deneholes in Hangman's Wood; the Council hope that other meetings in conjunction with the County Archæological Society may be held in the future. Valuable aid, which the Council most gratefully acknowledges, was rendered at the various meetings by the gentlemen named:—Mr. F. W. Elliott, Mr. D. J. Scourfield, Dr. Sorby, Col. Bryan, Mr. T. V. Holmes, Mr. Ashley, Mr. J. C. Shenstone, Mr. C. E. Benham, Prof. Boulger, Mr. Turner, Rev. Augustus Shears, Rev. J. W. Kenworthy, Mr. E. T. Newton, F.R.S., Mr. W. H. Dalton, F.G.S., Mr. F. C. Parmenter, Mr. G. F. Beaumont, F.S.A., Mr. Miller Christy, F.L.S., Mr. H. A. Cole, Mr. E. Lovett, and others. Special attention may be called to the meeting at Witham on July 23rd to promote an Annual Congress of the Natural History Societies of East Anglia. The Council hope that all members will do their best to make this Annual Congress a useful and interesting gathering. Full details of the scheme were given in the report of the meeting in the *ESSEX NATURALIST* (vol. x pp 360-368). A Committee to promote the Congress for 1899 has been formed, consisting of Mr. T. Southwell, F.L.S., and Mr. Nicholson (Hon. Sec.), for the Norfolk and Norwich Society; Mr. E. P. Ridley (Mayor of Ipswich), President, and Mr. G. H. Hewetson, Hon. Secretary, for the Ipswich Society, and Mr. J. C. Shenstone, and the Hon. Secretary, Mr. W. Cole, for the Essex Field Club.

The Council wish to acknowledge the kindness of the Technical Instruction Committee of West Ham and of Mr. Briscoe, the Principal of the Institute, for the arrangements they have made for the holding of Winter Meetings of the Club in the Institute. This concession will be of great service, and will be of even greater benefit in the future when the Museum and Library rooms come into our possession.

THE ESSEX NATURALIST.—Four quarterly parts of the Journal have been issued within the year, containing papers of very considerable local and scientific interest. It is a matter for congratulation that local papers relating to the investigations of the Club's members are still forthcoming. In the "Index" of the British Association, the Club is credited with 25 papers of this kind published during the 12 months ended the 1st of June, 1898. It is still a matter for regret that the "Notes" columns are not more occupied by observations of members and friends of the Club. The Editor is of opinion that this section might be made one of the most valuable features in our publication, and the attention of all lovers of natural history in the county is again strongly directed to this point.

THE LIBRARY, &c.—The Council are very glad to announce that Mr. Lockyer has kindly undertaken to resume the post of one of the Librarians which he occupied in the first years of the Club. The whole of the books have been removed to the premises in Woodgrange Road, and the stock of publications from Knighton Villas, Buckhurst Hill. The Council beg to thank Mr. H. A. Cole and Miss J. Cole for the accommodation of two rooms afforded for so many years to store these books and other goods. It is hoped that the books, &c. will now be got into order, so that when the new library room is ready they may at once be rendered again available by the members.

THE EPPING FOREST MUSEUM. —Referring to the lengthy statement in the last Annual Report, the Council regret that scarcely any progress has yet been made by the Epping Forest Committee of the Corporation of London with regard to the repair of Queen Elizabeth's Lodge, and the allotment of further space for the purposes of the Museum. Several meetings of the Committee have been held, but nothing has yet been settled. It would be useless adding more at the present stage. The Council sincerely hope that before the next Annual Meeting a satisfactory arrangement may be arrived at.¹ The Museum under the care of the Hon. Curator, continues to be largely attended, and very many of the visitors take great interest in it. A number of Schools and Natural History Clubs have visited it during the year, and on some of these occasions the Curator has attended to give a short exposition of portions of the contents.

A full report on the state of the Museum, and the plans for its extension and improvement, is reserved for a paper to be read by the Curator at a future meeting.

PRESIDENT.—The Council have much pleasure in again proposing Mr. Howard for re-election as President, in the hope that during his coming term of office he may take part in the opening of the New Museum and Head Quarters of the Club, the acquisition of which he has done so much to promote.

¹ We are very glad to state that, at a meeting of the Common Council of the City of London held at the Guildhall, on April 27th, a report from the Epping Forest Committee recommending the repairs of the Queen Elizabeth's Lodge and the re-conversion of the rooms on the first floor into one large room, was received and adopted, and a sum of £500 was voted towards the expense of such repairs. This matter is set out more fully on another page in the present part of the E.N. *Editor.*

THE ESSEX FIELD CLUB.

THE 184TH ORDINARY MEETING.

SATURDAY, JANUARY 28TH, 1899.

THE 184th ORDINARY MEETING was held in the Physical Theatre of the Municipal Technical Institute, Romford Road, Stratford, at 6.30 p.m., Prof. R. Meldola, F.R.S., V.P., in the chair.

Mr. F. W. Reader was elected a member of the Club.

Mr. Cecil Schwartz exhibited several specimens under the microscope and preserved in fluid. Among them were *Coccidium oviforme*, a Gregarine from the liver of a rabbit, the specimen showing the process of transformation into egg-shaped zoöspores by the formation of a capsule and the production of several spheres from its granular contents.

Also *Sagitta cephaloptera*, one of the Chaetognatha group of the Nematoda, from surface-net gatherings in the Crouch River, Essex. One of the three specimens shown contained a very large Nematode nearly half the size of the *Sagitta*.

Also young (Zoa) larvæ of Crustacea from surface-net gatherings, Crouch River.

Also *Digenia disclindrum*, parasitic in the bladder of *Rana temporaria*, from Epping Forest.

Also *Tubularia divisa* (Hydrozoa) from the Crouch. These specimens were preserved in 4 per cent. formalin two years ago, and were still in good condition. Mr. Schwartz strongly recommended formalin for all marine Hydrozoa.

Mr. Schwartz's collection, too, included specimens of *Sertularia*, *Obelia gelatinosa* (Campanulariadae) from the Crouch River; *Pygogonum littorale* from the Thames estuary, and other forms.

Dr. Dixon exhibited specimens of *Anhalonium lewinii*, a cactus growing in Mexico. The Indians eat the dried plant in their religious ceremonies. Dr. Dixon described the physiological effects of the alkaloid of the plant—the most remarkable being visions in which the air seemed filled with vague perfumes, and musical notes could be imagined to arrange about themselves a halo of harmonious sounds. But the most distinct of all were the colour visions, consisting of displays of ever varying colours, of incomparable brilliancy and beauty.

Dr. Dixon also exhibited a microscopic preparation of *Bacillus pestis*, the bubonic plague bacillus of India.

Prof. Meldola made some remarks on the chemical nature of the alkaloid of the cactus.

Mr. C. Oldham exhibited and presented to the Club's Museum an ancient clay "Loom-weight" [or fisherman's "net-sinker" ?] found in October last in a gravel pit at the rear of St. Swithin's Farm, Barking Side. The weight lay in a stratum of sand 7 feet from the surface.

Mr. Oldham also exhibited some Noctuae taken at "Sugar" in Epping Forest last season, including the rare *Cymatophora ocellaris* taken on the 5th July; *Cosmia diffinis* and *C. affinis*, *Dipterygia pinastri*, &c.

The Secretary exhibited the four privately issued volumes of Gen. Pitt-Rivers' magnificent work on the explorations at Rushmore, presented by the General to the Club. The 4th volume had only recently been issued.

Prof. Meldola made some remarks on the great scientific value of General Pitt-Rivers' researches, the investigations described and illustrated in his books were models of the methods of conducting and registering such excavations. General Pitt-Rivers was one of the pioneers of scientific archaeology, and of the right use of the "pick and shovel," and many of our greatest archaeological explorers owed their inspiration to him. A cordial vote of thanks was passed to General Pitt-Rivers for his valuable donation.

Mr. W. Cole called attention to the new Orders for the Protection of Wild Birds in Essex, and particularly to those relating to the Epping Forest District which as now enlarged under the recent mandate of the Secretary of State established one of the largest absolutely protected areas in England.

By means of the electric light lantern an exhibition was made of the fine series of Slides brought together by the British Association Committee formed for the "collection and preservation of Photographs of Geological interest." In the display of a selection of the lantern slides, preference was given to those having a direct bearing on the geology of England, east of a line from Dorset to the Wash. Two albums of prints of geological photographs were also

shown. The whole were exhibited by the courtesy of Prof. W. W. Watts, M.A., F.G.S., Secretary to the B.A. Committee. Running comments on the slides were given by Mr. T. V. Holmes, F.G.S., V.P., who explained the bearing of the "sections" exhibited on the geology of the coast of Essex and Suffolk. In the Eastern Counties, for example, Mr. Holmes observed, we have much Boulder-clay, a formation found also in many districts in the North and West. Now it need hardly be said that to the student of Glacial deposits living in the south-east, it is as important to note the characteristics of those of Yorkshire, Cheshire, or Cumberland as those of his own county. Again, in this part of England the chalk covers a very large area of the surface and may be found at a depth not exceeding 100ft. over large districts the surface of which is occupied by tertiary or by superficial beds. But it may also be found in Wiltshire, Lincolnshire, and East Yorkshire, and in North-Eastern Ireland.

Readers of the *ESSEX NATURALIST* will find that in Mr. Holmes' account of the proceedings of the Conference of Delegates at Liverpool, the want of geological photographs from the Eastern Counties is mentioned. But the greater average softness of the strata of these counties, which detracts from their picturesqueness and thereby tends to check photographic enthusiasm, is precisely the reason why the presence of geological photographers is especially needed in them. For in the more picturesque counties, with hard rocks in larger proportions, the sections, whether of the coast or some natural crag, or shown in quarries or railway cuttings, tend to remain wholly or comparatively uninjured from the effects of a few years' weathering. But a section in soft clays, gravels, and sands, whether natural or artificial, may lose much of its beauty and clearness in the course of a few weeks, from the mere washing down of material belonging to the upper beds over the surface of those beneath. In short, in Essex and East Anglia, there is special need for local photographers to take views of sections as soon as they appear without a delay of a single week.

A discussion was carried on by Prof. Meldola, and Mr. W. H. Dalton, F.G.S., late of H.M. Geological Survey.

Cordial votes of thanks were passed to Mr. Holmes and to the exhibitors, and to Prof. or Watts for the loan of the slides.

Tea and light refreshment was served at the close of the meeting, Mr. Briscoe, the Principal of the Institute, having very kindly allotted one of the lecture-rooms for the purpose.

THE 185TH ORDINARY MEETING.

SATURDAY, FEBRUARY 25TH. 1899.

The 185th ORDINARY MEETING of the Club was held in the Technical Institute, Stratford, at 6.30 p.m., the President, Mr. David Howard, F.C.S., in the chair.

Nominations of new members of the Council and officers were made in accordance with the Rules, in anticipation of the Annual Meeting to be held in March (see Report of the 19th Annual Meeting on March 25th).

Mr. J. Chalkley Gould exhibited an exchequer note relating to the payment of the salaries of the keepers of Epping Forest, which had been presented to the Epping Forest Museum by Mr. Brown, through Mr. C. Davies Sherborn. The document was similar to that presented to the Club by Mr. Gould in March, 1895, and which was printed and described in the *ESSEX NATURALIST* for 1896, vol. ix., p. 73. Mr. Gould made some remarks on this document which are embodied in his notes to be printed in the *ESSEX NATURALIST*. Mr. Walter Crouch also made some observations on the document.

Mr. Sewell exhibited a piece of a tree from the forest, which on being split open for making firewood, showed the blade of a razor embedded in the wood.

Mr. Cole said that instances of the kind were not very uncommon, and referred to the case reported by Mr. C. E. Benham in the *ESSEX NATURALIST*, vol. viii., p. 88.

Thanks were voted to the exhibitors, and to Mr. Brown for his gift of the forest document alluded to above.

In the absence of the author, Mr. W. Cole gave a resumé of a paper entitled "British Well-worms (*Phreoryctes*) with especial reference to a unique specimen from Chelmsford," by the Rev. Hilderic Friend. Mr. Friend's paper is printed in the present part of the *ESSEX NATURALIST*.

Mr. Cole remarked that considering the number of shallow wells in Essex, there ought to be no difficulty in obtaining further specimens, when the proper methods of searching for the *Phreoryctes* had been ascertained.

The President thought that from a sanitary point of view, considering the dangerous quality of water from most shallow wells, it would be consoling to know that the Phreoryctean fauna of Essex remained scarce.

The Secretary also gave an abstract of an important paper by the Rev. J. W. Kenworthy, Vicar of Braintree, entitled "Notes on a Neolithic 'Fascine' Lake Settlement at Skitt's Hill, Braintree, Essex," and exhibited on behalf of Mr. Kenworthy a selection of the specimens obtained. The paper will appear in full in the *ESSEX NATURALIST*.

A discussion ensued, in which the President, Prof. Meldola, Mr. Chalkley Gould, Mr. T. V. Holmes, and others took part. Cordial recognition of the interest of Mr. Kenworthy's observations was given by all the speakers.

Mr. T. V. Holmes said that in the case of valley deposits like those in which the Braintree articles were found it became of the greatest importance that the exact spot should be registered on a 6-inch Ordnance Map of the district. For with a little stream like that at Braintree, 50 yards here or there may imply a totally different age. But when the exact position and nature of the section in which the objects are found are given, the record of a find must be valuable whatever alteration in the name given—Neolithic, &c., &c.—to denote the age of the specimens, may eventually be resolved upon. Of course it is comparatively easy to get the specimens themselves determined by some expert, but unless the geological age of the deposits in which they are found is also settled, much of their interest is gone. Most of the endless and unsatisfactory disputes about objects found in the most recent beds result from the position being not indicated with sufficient accuracy. Mr. Holmes concluded by saying that it would be a good thing if we had explorers like

Mr. Kenworthy in most of the Essex parishes. So many sections in soft materials lose their clearness and value in a few weeks or even days. Records of any would be valuable if the nature of the material and the spot where the section appeared were noted by an intelligent local observer with sufficient exactness.

Mr. D. J. Scourfield then gave a lecture entitled "Some illustrations of Pond-life, with especial reference to forms occurring in Epping Forest." The lecture was in the nature of a demonstration of a remarkable series of coloured lantern slides representing some of the choicest examples of our fresh-water Protozoa, Rotifers, Polyzoa, &c. The slides, which were the work of Mr. H. M. J. Underhill, of Oxford, had been very kindly lent for the purpose by Mr. J. J. Vezey, Treasurer of the Quekett Microscopical Club.

It would be quite impossible to describe in detail these very excellent slides, remarkable alike for fidelity to nature and artistic treatment. The following notes, however, may serve to indicate the general scope of the series:

The Rhizopods were represented by such forms as *Amaba*, *Actinophrys*, and *Raphidiophrys*. The last named is a most interesting form on account of its colonial habits, each zooid being joined to its neighbours by little bridges of streaming protoplasm. Mr. Scourfield said that although most of the other Rhizopods were pretty common in the Epping Forest district, *Raphidiophrys* appeared to be very rare as he had only found it in one little pond in Wanstead Park.

The Infusoria formed a large detachment. There were examples of the exquisite little "collared" flagellate forms like *Codosiza* and *Salpingeca*, of the ciliate forms such as *Vorticella*, *Ophrydium*, &c., and of the suctorial group such as *Acineta*, *Podophya*, and *Dendrosoma*. All these have been recorded from the Forest area and most of them are in fact quite common.

The Sponges were illustrated by *Spongilla fluviatilis* in various stages. This species and probably also one or two others occur in the Lea and the Roding and at Wanstead Park.

The Hydroids comprise the three species of *Hydra* (*H. vulgaris*, *H. fuscæ*, and *H. viridis*) all of which occur commonly in our ponds and pools, and *Cordylophora leuostis* a brackish water form which seems to be pushing its way more and more into fresh water, but has not yet been seen in Epping Forest area. It might be worth while looking for it in the Lea and its associated waters.

The Rotifers were only represented by the sedentary species (*Rhizota*) but the drawings of these creatures were exceptionally fine. The chief kinds shown were *Floscularia*, *Stephanoceros*, *Oecistes*, *Melicerta*, and *Lacinularia*. The last mentioned form has apparently never been seen in the Forest district, but the others are for the most part fairly common.

The Polyzoa or Bryozoa were well illustrated by charming drawings of *Fredricella*, *Paludicella*, *Alyonella*, *Plumatella*, and *Cristatella*. Wanstead Park and Higham Park have yielded at different times specimens of all these forms.

Hearty votes of thanks were passed to the authors of the papers, and to Mr. Scourfield for his most interesting lecture, and the meeting ended with the usual service of light refreshment in one of the lecture-rooms of the Institute.

THE NINETEENTH ANNUAL GENERAL MEETING
AND 186TH ORDINARY MEETING.

SATURDAY, MARCH 25TH, 1899.

The 19th ANNUAL MEETING was held in the Physical Lecture Theatre in the Municipal Technical Institute, Romford Road, Stratford, at 6.30 p.m., the President, Mr. David Howard, F.C.S., in the chair.

The minutes of the 18th Annual Meeting held on March 26th, 1898, and printed in the ESSEX NATURALIST, vol. x., pp. 256-258, were read and confirmed.

The Treasurer, Mr. W. C. Waller, read a summary of the Treasurer's Statement of Accounts for 1898. It was announced that the Council had decided to leave the form of the balance sheet to be decided upon by a small Committee, and the meeting agreed to this, and that the revised statement should be printed in the ESSEX NATURALIST.

The Report of the Council for the year 1898 was read by the Secretary (see pp. 18-24).

The Statement and Report were received and adopted.

At the meeting on February 25th, 1899, it was announced that the following members retired from the Council in accordance with the Rules:—Mr. C. E. Benham; Mr. Walter Crouch, F.Z.S.; Mr. E. Durrant (*on vacating office as Librarian*); Mr. F. W. Elliott, and Mr. Chalkey Gould.

And at the same meeting the above-named members were duly proposed for ELECTION into the COUNCIL.

Mr. Alfred Lockyer on being nominated as one of the Librarians, also vacated his seat on the Council, his place being taken, as above indicated, by Mr. E. Durrant.

AS OFFICERS for 1899 the following were nominated:—

As *President*, Mr. David Howard, J.P., F.C.S.; *Treasurer*, Mr. W. C. Waller, M.A., F.S.A.; *Hon. Secretary and Curator*, Mr. W. Cole, F.L.S., F.E.S.; *Assistant-Hon. Secretary*, Mr. B. G. Cole; *Librarians*, Mr. Alfred Lockyer and Mr. W. C. Waller, M.A., F.S.A.; *Hon. Counsel*, Mr. W. C. Dare, B.A., Barrister-at-Law; *Hon. Solicitor*, Mr. H. I. Coburn.

As *Auditor (for Council)*, Mr. Walter Crouch, F.Z.S.; (*for Members*), Mr. J. D. Cooper.

No other members having been proposed, the above gentlemen stood elected by Rule VII. as members of the Council and Officers for the year 1899 and were so declared by the Chairman.

[The following therefore constitute the Officers and Council for 1899:—

PATRON.—H.R.H. the Duke of Connaught and Strathearn, K.G.

PRESIDENT.—David Howard, J.P., F.C.S., F.I.C.

PERMANENT VICE-PRESIDENTS.—(*Under Rule IV.*)—Prof. R. Meldola, F.R.S., F.R.A.S., &c., (*President 1880-82*); Prof. G. S. Boulger, F.L.S., F.G.S. (*President 1883-84*); T. V. Holmes, F.G.S., M.A.L. (*President 1885-87*); E. A. Fitch, F.L.S., F.E.S. (*President, 1888-91*); Dr. Henry Laver, F.L.S., F.S.A. (*President 1892*); Frederic Chancellor, J.P., F.R.I.B.A. (*President 1893-94*).

OTHER MEMBERS OF COUNCIL.—John Avery, C.A., Rev. R. E. Bartlett, M.A.; C. E. Benham; Horace T. Brown, F.R.S.; E. N. Buxton, J.P., Aldmn. C.C., D.L., &c.; Miller Christy, F.L.S.; Walter Crouch, F.Z.S.; Bryan Corcoran; L. Cranmer-Byng; E. Durrant; F. W. Elliott; A. J. Furbank; I. Chalkley Gould; J. E. Harting, F.L.S., F.Z.S.; Rev. W. S. Lach-Szyrma, M.A.; J. H. Porter; Rev. A. F. Russell, M.A.; J. C. Shenstone; John Spiller, F.I.C., F.C.S.; F. H. Varley, F.R.A.S.; George E. Vaughan; T. Hay Wilson.

HON. TREASURER.—W. C. Waller, M.A., F.S.A.

HON. SECRETARY AND CURATOR.—William Cole, F.L.S., F.E.S.; ASSIST. HON. SECRETARY—B. G. Cole.

HON. LIBRARIANS.—Alfred Lockyer and W. C. Waller.

HON. COUNSEL.—W. C. Dare, B.A., Barrister-at-Law; HON. SOLICITOR.—H. I. Coburn.]

The President then delivered his Annual Address, entitled "Life Problems in Modern Science," an abstract of which is printed in the present part of the *ESSEX NATURALIST* (see pp. 15-17).

Professor Meldola, while guarding himself from endorsing all the conclusions in Mr. Howard's address, proposed that the most cordial thanks of the Club be accorded to Mr. Howard for his services as President during the past official year.

Mr. F. W. Elliott seconded the motion, which on being put to the meeting was carried unanimously amid applause.

Mr. Howard briefly returned thanks.

The 186th ORDINARY MEETING was then held, the President in the chair.

A lecture was delivered by Mr. Fred. Enock, F.L.S., F.E.S., on "The Life History of the Tiger-Beetle (*Cicindela campestris*)."

Mr. Enock's address was more than a mere lecture—it was a graphic record of a series of observations, some entirely new, dealing with the whole life-habits and metamorphosis of this interesting beetle (the larva of which, from its mode of capturing its prey, has been called the "British Ant-lion") and abundantly demonstrated the great interest attaching to the close study of a common insect which may be observed in Epping Forest, and on sandy heaths in Essex and around London. The Lecturer's observations were illustrated by an admirable series of coloured lantern slides, made from his own inimitable drawings "from life," several of which by ingenious contrivances were moved so as to give an appearance of life to the pictures.

Mr. Enock was heartily thanked for his lecture, on the proposal of the President, seconded by Professor Meldola—and some discussion took place on the habits and metamorphosis of the common House-fly, and on the importance and interest of the study of living insects in the field. Mr. Meldola alluded to the efforts made by Professor Miall to encourage this branch of biological study.¹

Mr. Enock briefly replied, and the meeting ended with the usual *Conversazione*.

¹ See Professor Miall's Address to Section D (Zoology) of the British Association at Toronto on August 19th, 1897 (*Brit. Ass. Rep.* 1897, pp. 697-653) and also his remarks made before the Corresponding Societies Committee at the same place (*Report*, 1897, pp. 29-32).—Ed.

QUEEN ELIZABETH'S LODGE AND THE EPPING FOREST MUSEUM.

IN the annual report of the Council for 1897 (vol. x., pp. 252-3) a statement of the position of the Epping Forest Museum was given, and hope was expressed that the whole question of the repair and restoration of Queen Elizabeth's Lodge so as to afford more space for the Museum would be taken in hand by the Epping Forest Committee. This matter has been brought to a head in a Report of the Committee presented to the Court of Common Council on April 13th last, *which report was unanimously agreed to by the Court* and which has since been printed and circulated. The report is of great importance with regard to the future of the Lodge and the Museum, and some extracts from it may be interesting. After summarising the history of the Museum, the report goes on to say:—

“ The exhibition is very popular, and has been visited by many thousands of people, but the space at present available is insufficient for the increasing number of exhibits. The Essex Field Club are desirous of enlarging the Museum, if additional space can be provided in the Lodge.

“ We have given considerable attention to the structural condition of the Lodge, both externally and internally.

“ The whole of the space on the first floor was originally one large room corresponding in dimensions to that on the second floor; but at some period anterior to the Lodge being handed over to the Conservators, it was divided into three rooms; some of the windows have been filled in, and it has been otherwise mutilated

“ We accordingly consulted Mr. J. Oldrid Scott, who is an eminent architect skilled in Tudor architecture, as to the condition of the building, the cost of throwing the rooms on the first floor into one, providing a new oak ceiling and additional windows on the first floor, removing the plaster and otherwise improving the appearance of the exterior and providing bedrooms for the keeper in lieu of the rooms now used by him on the first floor.”

A detailed estimate of the repairs, &c., is then given amounting to £750 and the report continues:—

“ We are of opinion that it is a matter of urgent necessity that the work should be taken in hand at once, not only with the object of extending the Museum, but also of strengthening the structural condition of the Lodge and improving its external appearance, and that it should be carried out in accordance with Mr. Scott's reports, of which we annex copies.

“ We therefore beg to recommend bearing in mind the obligation thrown upon the Conservators—that your Honourable Court will be pleased to grant the sum of £500 for the structural alterations to the interior and restoration of the exterior of the building, as advised by Mr. Scott

"If found necessary to construct be rooms for the keeper and his family, in lieu of those now in use, we shall probably be able to provide the cost thereof out of casual sums received for privileges conferred on owners of enclosed lands adjoining the Forest."

Appended to this document are two detailed reports by Mr. Oldrid Scott, from which we make extracts of matters of interest in connection with the structure and history of the Lodge, and its use as a local Museum. It will be remembered that in 1895 Mr. James Cubitt, F.R.I.B.A., kindly made a careful examination of the Lodge on behalf of the Club, and wrote a Report which was published in the *ESSEX NATURALIST* for 1896 (vol. ix., pp. 166-7). By comparison of that report with those prepared by Mr. Scott, it will be seen that the opinions of the two highly skilled architects are practically identical. Mr. Cubitt subsequently made some suggestions as to the structural alterations, or rather restorations, required to adapt the Lodge for the purposes of a permanent Museum, with which Mr. Scott's later opinion coincides, and which was embodied in the petition for "more room" presented by the Club to the Epping Forest Committee.

Mr. Scott's first report is dated February 20th, 1897:—

"At the request of the Epping Forest Commissioners, conveyed to me by Mr. E. N. Buxton, I visited the Lodge at Chingford a few days ago and made an examination of the building. It consists of an oblong structure of timber, measuring nearly 30ft. by 20ft., internally divided into three stories, with a square staircase projecting from the main building, which is some 4ft. square. The whole is most solidly built of massive timber, which appears to be in exceptionally good condition; the walls are quite upright and the floors are level—a condition very rarely met with in ancient timber houses. The Lodge appears from the character of its architectural details, to have been built in Henry VII.'s reign, towards the end of the 15th century--its being called Queen Elizabeth's Lodge probably arising from her having made use of it. Its original arrangement was very peculiar, consisting as it did of two large rooms, one occupying each of the upper floors, and some small apartments below. It may have been a Hunting Lodge for the use of the Sovereign, the top room being a fine parlour for rest and refreshment, the room below for dressing, and the small chambers on the ground floor for attendants. There is a dignified character about the building which seems to me to distinguish it from the usual buildings of its age, and though it is so small in size it was evidently intended for a special purpose. The great care which was evidently bestowed on the selection of timber used in its construction points in the same direction.

The upper floor retains its old character; it is a fine room rising into the roof, divided into three bays by boldly arched roof trusses; it has been restored, and is in all respects in a satisfactory condition.

The middle floor was divided into rooms a considerable time since; the partitions are of oak, but thin and very rough; at the same time the ceilings were boarded with deal. These divisions, though of some age, are of no sort of merit or value, and I see no reason why they should not be removed and the room restored to its original condition. Its only ornamental features which remain are the finely moulded beams of the ceiling, which in position agree with the arched principals in the room above. I should strongly recommend that this room should be brought back to its original state as far as this is possible."

Mr. Scott at first thought that this room had originally a number of windows, but a more careful examination failed to reveal traces of the former existence of these; he thinks, however, that three should be added, which would add much to the convenience of the room and improve the external effect.

"The present ceiling of the first floor consists of thin deal boards fixed below the old joists. I had expected to find the joists had been originally exposed to view, but on removing two of the boards, it was evident that these must always have been a ceiling of some kind, the joists, which have every appearance of being original, being deep and comparatively thin, such as are used in modern floors. These would not look at all well if exposed, and I think it will be best simply to substitute oak boarding for the deal now in use.

* * * * *

If it should be decided to give up the first floor to the Museum, I understand it will be necessary to supply the rooms on this floor, which are now used by the keeper of the Lodge, in some other way. I fear that it would be hardly possible to make an addition to the Lodge large enough for the purpose without causing a considerable change in its appearance. Perhaps a partly detached building could be added behind, but it is hard to see how this could be done without taking away too much light.

If not too expensive, the best plan would, I think, be to build a cottage in the garden belonging to the Lodge to the south-east of the main building. There is an excellent site here, and the effect architecturally would be very pleasing.

One of the rooms on the ground floor of the Lodge would be required for the attendant in charge of the Museum during the day, and the others would no doubt be extremely useful for unarranged specimens, &c."

With respect to the exterior of the building, Mr. Scott much regrets the restoration which was carried out about 16 years ago, and which gave an appearance to the building which it did not originally bear. On removing some of the modern timber-facing he found that the small uprights do not represent old timbers, none of those removed having any old uprights behind them:—

"The larger pieces appear to correspond roughly with the original framing, but, so far as I was able to examine, the old timbers are not fit to be exposed, the surfaces being seriously decayed. I have come to the conclusion that it would not be practicable to remove the modern facing."

Mr. Scott recommends that the plasterwork should be renewed with cement plaster brought flush with the surfaces of the timber work ; that barge boards of suitable design should be substituted for those now in position ; and that the rough-case should be removed from the old chimney stack, and the brick work pointed.

We may now, therefore, hope to see the old Lodge skilfully repaired, to become one of the principal objects of interest in the neighbourhood. The additional space afforded to the Museum will permit of a more systematic and complete representation of the natural history and antiquities of the Forest. The Club has petitioned the Epping Forest Committee to establish some efficient means of warming the building by means of hot water, and to give our Curator the use of a room or rooms for work and storage. It is also very desirable that the Museum should be lighted up during the dark afternoons in winter. If these things are done, the building will be vastly more suitable to its purpose, and it will need only a little perseverance and co-operation of those interested in the Forest to render the Epping Forest Museum worthy of its setting in the midst of one of the finest recreation grounds in England.

ESSEX AS A WINE-PRODUCING COUNTY.

By MILLER CHRISTY, F.L.S.

SEVERAL months since, Mr. Walter Sergeant, of Dunmow, writing to one of our leading county papers,¹ raised the question :- Has the vine ever been cultivated in Essex to any large extent for the purpose of making wine ?

We are safe, I think, in answering this question by a direct negative. At the same time, there can be no doubt whatever that, in early times, viniculture was successfully carried on at not a few places in Essex. Of this, we have clear evidence in the fact that many fields and pastures in various parts of the county still retain (though sometimes in a corrupted form) the name of "The Vineyard." Moreover, written records proving that the vine was once cultivated in our Essex valleys still exist and will be noticed hereafter.

¹ S. *The Essex County Chronicle*, Dec. 9th, 1898.

This subject is of interest from more than one point of view. I propose, therefore, in what follows, to repeat and amplify the evidence in support of the foregoing statements which I adduced when replying to Mr. Sergeant's enquiry.²

That viniculture was formerly carried on in many other counties in the South of England is, of course, well known. The subject has been discussed by not a few competent writers, among the chief of whom may be mentioned the Rev. Samuel Pegge,³ the Hon. Daines Barrington,⁴ Richard Gough,⁵ Hudson Turner,⁶ Sir Henry Ellis,⁷ Charles Roach Smith,⁸ J. Maskell,⁹ Edmund Venables,¹⁰ and J. Horace Round.¹¹ Moreover, a great many notes relating to the former occurrence of vineyards in the southern counties of England are to be found in the pages of *Notes and Queries*.

It should, however, be mentioned that one of the foregoing writers, namely Barrington, criticising the statements of the Rev. Samuel Pegge, altogether denies the possibility of the vine having ever been cultivated in this country for the purpose of making wine and declares that the numerous ancient records in which *vineæ* are mentioned refer, not to vineyards as we now understand the term, but to gardens in which pears, apples, or other fruits were cultivated for the purpose of making some kind of perry or cider. Barrington's arguments, which he states at great length, may apply in some cases; but they are altogether inconclusive as proof that the vine could not be, and never has been, cultivated in this country for the purpose of wine-making, and they have failed to convince anyone. The controversy between Pegge and Barrington is, however, interesting and amusing on account of the vast amount of profound erudition which the disputants displayed, side by side with a profound ignorance of easily-accessible every-day knowledge. Each ostentatiously quotes and discusses many obscure and abstruse passages from the early Greek, Latin, Saxon, and Norman writers; but each neglects, in a manner not uncommon at the period, to adduce

² See *Essex County Chronicle*, Dec. 16th, 1838

³ *Archæologia*, vol. i. (1779), pp. 319-332; also vol. iii. (1776), pp. 53-66.

⁴ *Ibid.*, vol. iii, pp. 67-95.

⁵ *Gentleman's Magazine*, 1775, pp. 513-516.

⁶ *Archæological Journal*, vol. v. (1848), pp. 295-300.

⁷ *General Introduction to Domesday Book* (1833), vol. 1, pp. 116-122.

⁸ *Collectanea Antiqua*, vol. vi. (1867), pp. 76-109.

⁹ *Notes and Queries*, 7th series, vol. vi. (1888), pp. 321-322.

¹⁰ *Notes and Queries*, 7th series, vol. xii. (1891), p. 10.

¹¹ See *post*.

more modern facts and records which would have at once decided the point at issue between them. As a matter of fact, the records which speak of the former existence of vineyards in this country are very numerous, and refer unquestionably (at least, in the vast majority of cases) to true vineyards in which the grape-vine was cultivated for the purpose of making wine.

It can hardly be disputed that the vine was first introduced into Britain by the Romans. At all events, records of its cultivation here commence in their time; and there can be very little doubt that, being a wine-drinking people, they cultivated it more or less extensively for the purpose of wine-making, though there is very little direct evidence of the fact. Some have held that the name Winchester was derived from the fact that the vine was extensively cultivated there by the Romans.

In the middle of the Eighth Century, Bede wrote that the vine was grown in some places in Britain; and, in the Tenth Century, King Alfred legislated for the regulation of English vineyards; but it may be doubted whether the vine was much cultivated in Saxon times.

After the Conquest, references to the cultivation of the vine in England become frequent in old records. In the park at Windsor, there must have been extensive vineyards, and a great deal of information respecting the methods of cultivation adopted, the salaries paid, and the result obtained, especially during the reigns of Edward III. and Richard II., may be gleaned from the Public Accounts of the period, extensive extracts from which have been published by Mr. Charles Roach Smith.¹² Moreover, a small vineyard existed at Windsor as late as the reign of George III.¹³

It may even be doubted whether, since Norman days, there has ever been a time when the vine has not been cultivated in England to some small extent for the purpose of wine-making. Before the Reformation, probably most of the larger Religious Houses in the South of England had their vineyards. After the Dissolution, the cultivation of the vine here probably became more or less neglected; but, that it was not altogether given up, we may gather from a work on the subject published in 1666 by John Rose, gardener to King Charles II.¹⁴ From this work

¹² *Collectana Antiqua*, vi. pp. 96-101.

¹³ Tighe and Davis: *Annals of Windsor* (1858), p. 534.

¹⁴ *The English Vineyard Vindicated* (Lond., 16 m.s., 1666). There were later editions in 1672, 1675, and 1691.

(which was put into shape by John Evelyn, who also supplied a preface), it appears that, at the time of its publication, the cultivation of vineyards had greatly declined; but, as the author urged, this was to be much regretted, there being in England many places well suited (he declares) to the cultivation of the vine. He proceeds, therefore, to explain how the sites of vineyards should be chosen, what kinds of vines should be planted, and how they should be managed, closing with an advertisement of "sets" which he had for sale at "very reasonable rates." About the same time, the subject was also discussed in a work by J. Worlidge, Gent., on fermented liquors producible from fruits growing in Britain, of which a second edition appeared in 1678, and a third in 1691.¹⁵

Up to about the year 1870 (and perhaps later), a Mr. Darkin, a builder, of Bury St. Edmunds, annually vinted the produce of St. Peter's Vineyard in that town. The vines were grown against a high wall and the grapes were of excellent flavour. The yield was from a pipe to a pipe-and-a-half annually (according to the season) of excellent wine, "like champagne."¹⁵

The existence of two vineyards belonging to the Marquess of Bute, at Castell Coch, near Cardiff, is too well known to need extended notice here. The first vines were planted in 1875 and the first wine—a very small quantity—was made in 1877. The vines are of the kind known as "Gamy Noir." There is now a regular annual vintage; and, notwithstanding occasional failure in some inclement years, the venture (which has long since passed the experimental stage) has been a practical and commercial success. For some time past, "Welsh Wines" have been regularly quoted in the catalogues of Messrs. Hatch, Mansfield, and Co., Ltd., of Cockspur Street, S.W. Further information on this subject will be found in an article by Mr. H. A. Pettigrew in a recent number of the *Land Magazine*.

Coming now to consider the County of Essex, we find from the List of Essex Field Names recently collected and published by our Treasurer, Mr. W. C. Waller, F.S.A.,¹⁶ that there are, in the widely-scattered parishes of Great Hallingbury, Great

¹⁵ *Vinctum Britannicum, or a Treatise of Cider and other Wines and Drinks extracted from Fruits growing in this Kingdom* (London, 8vo.)

¹⁵ *Notes and Queries*, 27th Nov. 1863.

¹⁶ See *Trans. Essex Archaeol. Soc.*, n. s., vol. v., pp. 144-181; vol. vi., pp. 63-84 and 258-277; vol. vii., pp. 65-92 and 285-327 (and in progress).

Coggeshall, North Ockendon, Havering, and Tendring, fields which are still called "The Vineyard," while at Roydon there is a "Vineyard Hill," at West Bergholt a Wine Mark Field, at Great Horkesley a Vinese Field, and at Stapleford Abbots there is a field known as "Vineys"—the latter very likely a corruption. I remember that, many years since, the Rev. W. Gibson, of Tilty, pointed out to me a pasture still called "The Vineyard" which lies immediately adjoining the site of the Abbey of Tilty, on the western slope of the picturesque and well-sheltered valley in which the Abbey stood. Dr. Laver informs me that, at Copford, there is a field, close to the village school, which retains the name of "The Vineyard." At Chelmsford, adjoining the Recreation Ground, there is a road known as the Vineyards; and, at Great Baddow, close to Chelmsford, there is a residence known as "The Vineyards;" but I cannot say whether these names are ancient or not.

The residence of our member, Mr. William Murray Tuke, standing in an elevated position near the summit of Windmill Hill and overlooking the whole of the town of Saffron Walden, is known as "The Vineyards." Mr. Tuke gave the house this name (as he has been good enough to inform me) when he built it, some fifteen or twenty years ago, owing to the fact that a field (9 acres 19 perches in extent, a portion of which now forms part of the grounds attached to the house), bore the same name, as it had probably done for centuries. It is by no means improbable that this field (which lies on the hill-side, with a considerable slope to the southward) may formerly have been cultivated as a vineyard by the monks of the Abbey of Walden, the site of which is scarcely more than a mile distant. Again, at Ingatestone Hall, there is a small piece of ground, lying on the south side of the house, which is said¹⁷ still to bear the name of "The Vineyards."

At Holfield Grange, near Coggeshall, about half-a-mile westward from the house and on the margin of the park, there is a wood known as "Vineyard Wood," which I have recently been able to visit through the kindness of Mr. R. D. Hill. In this wood, there is a small sheltered valley, sloping sharply to the south-west, which is probably the site of the ancient vineyard from which the wood took its name. There can be very little doubt that here, in mediæval days, the monks of the Abbey of

¹⁷ See *Notes and Queries*, 28th Dec. 1856.

Coggeshall, two miles distant, grew their wine ; but there is no evidence to show how late they continued to do so. After the place ceased to be used as a vineyard, it was apparently converted into an ordinary orchard, for very old apple- and other fruit-trees grow among the firs with which the lower part of the valley is now planted, and the upper part is still used as a nursery ground. The whole of the little valley is sheltered on the north side by a huge brick wall, nearly fifteen feet high in places and not much short of a quarter-of-a-mile in length, on the southern side of which wall- fruit-trees are grown. This wall was built (so far as one can judge from its appearance) early in last century. If so, it was, in all probability, erected long posterior to the time when the vine was cultivated at the spot and was intended to shelter the fruit-trees which succeeded them.

Mr. Walter Sargent states, in his letter already alluded to, that,

“in regard to Dunmow, there are several stray vines dotted about the place, and, as these, though unprotected and growing outside, bear plentifully a good-sized grape, one is inclined to think that they are only remnants of a higher cultivated stock.” It is, however, scarcely safe to assume that the fact cited is evidence of the former existence of a vineyard at Dunmow ; for the vines in question may easily have escaped from some modern cottage garden.

In the park, at Down Hall, the seat of Lord Rookwood, in the parish of Hatfield Broad Oak, there is a spot which appears to be the site of a former vineyard, as I am informed by the Rev. F. W. Galpin, rector of the parish.¹⁸ I have not myself had an opportunity of visiting the spot ; but Mr. Galpin states that the supposed vineyard lies close to the house, on a steep slope, which has been terraced. Lord Rookwood, however, doubts whether the ancient terrace (which is bounded at each end by the remains of two bastions) is anything more than an ornamental garden-terrace made, probably, about the year 1700, when Prior, the poet, lived at Down Hall.

It may be safely asserted that Mr. Waller's list of Essex Field Names will show, when its publication shall have been completed, that not a few other fields in various parts of our

¹⁸ If it should hereafter be demonstrated that the “Belcamp” of Domesday Book (see *post*, p. 41) was at Down Hall, this vineyard might be identified, without hesitation, with that recorded in Domesday as existing at “Belcamp.”

county still retain the same name; thereby affording evidence of the use to which they were anciently put.

There is, however, evidence, much clearer than the foregoing, testifying to the fact that the vine was once cultivated at various places in this county for the purpose of making wine. This evidence takes the form of actual contemporary records. For instance, there are in Domesday Book distinct records of no fewer than *eight* vineyards which existed in Essex at the time of the Great Survey (1086). It appears, indeed, that Essex was able to claim no less than *one-fifth* of all the vineyards existing in England at that time; for, according to Sir Henry Ellis,¹⁹ the whole of Domesday Book contains references to the existence of only about forty vineyards in England.

The eight Essex records in Domesday Book are as follows²⁰ :—

- (1.) At Rayleigh, on the land of Suene, there were “vi. arpenni²¹ of vineyard, and it yields [says Domesday Book] xx., barrels of wine in a good season ” (fo. lxxxvi.).
- (2.) At Mundon, near Maldon, on the land of Eudo, there were “ii. arpenni of vineyard ” (fo. xcvi.).
- (3.) At either Stambourne or Toppesfield, on the land of Hamo, there was “i. arpennus of vineyard ” (fo. cx.).
- (4.) At Great Waltham, on the land of Geoffrey de Mandeville, there were “x. arpenni of vineyard ” (fo. cxv.).
- (5.) At Debden, on the land of Radulphus Bainard, there were “ii. arpenni of vineyard which bear and ii. others which do not bear ” (fo. cxlvi.).
- (6.) At Stebbing, also on the land of Radulphus Bainard, there were “ii. and a half arpenni of vineyard, and only half of it bears ” (fo. cxlvii.).
- (7.) At Castle Hedingham, on the land of Alberic de Vere, there were “vi. arpenni of vineyard ” (fo. clii.). Of this vine-

¹⁹ *Gen. Introduction to Domesday Book*, i., p. 116.

²⁰ For convenience, I have quoted the translated entries appearing in *The Domesday Book relating to Essex*, translated by T. C. Chishdale-Marsh (Chelmsford, 4^o, 1864).

²¹ The *arpent* or *arpennus*, a French measure of land, was used, both in France and in England, almost exclusively as a measure of vineyards, though there are several cases in Domesday Book in which it is applied to woodland or meadow. There are, however, according to Sir Henry Ellis, only four cases in Domesday Book in which the extent of a vineyard is indicated by its acreage. The extent of an arpent, which is uncertain, was perhaps variable, but it probably ranged from half-an-acre to an acre.

yard, Morant says ²² that it was situated “on the west side of the Castle, between it and Baylie Street, [at a spot since] called the Lord’s Orchard, where lately grew wild vines, bearing red grapes.”

(8.) At “Belcamp” (possibly Belchamp Walter, or perhaps, Down Hall, in Hatfield Broad Oak, as Chisenhale-Marsh suggests), also on the land of Alberic de Vere, there were “xi. arpenni of vineyard, i. of which bears” (fo. cli.).

It thus appears that, in 1086, nineteen years after the Conquest, there were in Essex at least forty-two arpenni and a half of vineyards, of which over thirteen arpenni had not yet come into bearing.

Mr. J. Horace Round has submitted these eight entries to careful examination ²³ and has called attention to the facts that, in every case, the vineyards in question were new, having been planted since the days of King Edward the Confessor; that, in several cases, they had been so newly planted that parts of them had not yet come into bearing; that they are all measured by the arpent—a French measure; and that they were all, or nearly all, situated upon, or near to, manors held in demesne by a tenant *in capite* and on which such tenant resided. From these facts, Mr. Round draws the conclusion (which the entries seem fully to justify) that, whether or not viniculture had been carried on here by the Romans, it had fallen into disuse during the days of the Saxons—a beer-drinking people—and had been revived again, after the Conquest, by the Norman nobles, who felt the need of the wine to which they had been accustomed in their native land, and therefore planted vineyards in the vicinity of their chief residences.

We may now turn from Domesday Book to notice other early records proving the former existence of vineyards in this county.

Mr. Horace Round, in his paper above alluded to, refers to an entry on the Roll of 1130 which mentions the making of two vineyards on Peverell’s land at Maldon, gives particulars of the pay and clothing of a vineyard man, and speaks of sixteen barrels

²² *Hist. of Essex* (1768), ii., p. 291.

²³ Mr. Round’s paper on the subject, which was read at the forty-sixth Annual Meeting of the Essex Archæological Society at Colchester, on April 20th 1899, since this article was written, appears in the *Transactions* of the Society (vol. vii., n.s., pp. 249-251).

of wine having been sent up to London from Maldon in the year named. These entries²⁴ run as follows:—

“Et in ij Vineis de Mealdona faciend’ et Vestitura et solidat’ Vineatoris—lij s.”

“Et in xvj Tonell’ em’dis et in conductu’ usq’ ad Mealdona de Mealdona ad Lond’—x s. . . .”²⁵

An anonymous writer recently made the following statements²⁶ as to the former existence of vineyards at Great and Little Maplestead:—

“In Great Maplestead, we find mention of a vineyard in 1252, when John de Hoding granted to Sarah de Martnall and Isabella, her daughter, all his lands in Mapletrested, which he had of his nephew, Kalph de Hoding, namely the third part of two carucates of arable, and alder ground called ‘le Rede fen’ with a mill below it, and a vineyard. This vineyard was probably situated on the slope of the hill, above Hull’s Mill, in Great Maplestead.

The neighbouring parish of Little Maplestead also had a vineyard; for, in a deed without date of the time of Edward I., Robert de Harlow, of Little Maplestead, quit-claims to the Hospitallers of St. John of Jerusalem, living at Little Maplestead Hall (or, as it was then called, ‘le Hospital’), the annual rent of twelve pence arising from a parcel of land in Hokholt, near their vineyard.”

Mr. C. Roach Smith has published²⁷ extracts, supplied to him by Mr. Joseph Burt, from the Public Records on this subject as follows:—

Hadley. Extent 31 Edward I. [1303.] Liberi tenentes. Johannes Franceys tenet i messuagium &c.; et predictus Johannes et omnes alii tenentes levabunt fenum in prato domini et habebunt 12 lagenas cervisie vel 12 d. et fodiet in vineis i dolam que continet in longitudine 4 pedes et in latitudine 3 perticatas. Item colliget uvas per i diem per se vel alium hominem et tunc habebit cibum et potum de domino.

²⁴ See *Magnum Rotulum Saccarii, vel Magnum Rotulum Pipæ, &c.*, edited by the Rev. Joseph Hunter, F.S.A. (London, Records Commission, 89, 1833), p. 135.

²⁵ Apparently these passages may be translated:—“And in making two vineyards of Maldon, and in clothing and wages of the vineyard keeper—52 shillings. . . . And in buying sixteen tuns and conveying them to Maldon and from Maldon to London—10 shillings.”

²⁶ *East Anglian*, n.s., iii. (1889-90), p. 157.

²⁷ *Collectanea Antiqua*, vi., pp. 101-102. I have been unable, even with the kind assistance of Mr. Salisbury, to discover the originals of these documents at the Record Office.

Rogerus de Brumf tenet i messuagium quod aliquando fuit &c. Fodiet tu' [tantum?] in vineis domini i dolas precium dote i d., &c.^{27a}

Minister's Accounts, 9-16, Edward II. [1316-1323]. Idem computat in i homine conducto per 20 dies provinei scindendis et reparandis, 4s. — d.

Anno 10 [1317.] De exitibus vinee nihil respondet quia non fuerant uvae hoc anno. Et de 5 d. de herbagio vendito in eadem vinea sicut continetur ibidem.²⁸

A Latin deed of the Thirteenth Century, now in the Public Record Office, refers to the leasehold sale of a house, garden, shop, vineyard, and premises at Colchester.²⁹

In the Thirteenth Century, too, there was, adjoining Colchester, a piece of land known as Wynescroft, which is thus alluded to in a deed of the year 1242 witnessed by the Bailiffs of Colchester and others³⁰:—"terra cum pertinentiis que vocatur Wynescrafte in suburbio Colecestrie, et quicquid in dicta terra" &c.

In the year 1380, a certain Thomas Deynes was granted, at a rental of two shillings annually, a piece of ground, for three *stulpes* or *spores*, to carry a certain vine opposite the house of Clement Dyer, in North Street, Colchester.³¹

There is still at Colchester a "Vineyard Lane." It runs for some distance parallel with the outer side of the old town wall, on the southern aspect. This suggests that vines were formerly grown here, trained against the sunny side of the town wall; but whether this was done by the Romans or (as is more probable) in later times, by the monks of St. John's Abbey, only a few hundred yards distant, must here be left in doubt.

27a Free Tenants. John Franceys holds one messuage, and the aforesaid John and all the other tenants carry hay in the Lord's meadow, and they have twelve flagons of ale or 12 d., and shall dig in the vineyard one dole, which contains in length 4 feet and in width 3 perches. Also he shall gather grapes for one day, either himself or another man, and then he shall have food and drink from the Lord.

Rogers de Brumf holds one messuage . . . and he shall dig also in the vineyard of the domain two doles at the price of a penny each dole, . . .

28 And the same accounts for the hire of one man for twenty days, for tending and repairing the vineyard—4s. d.

The tenth year [1317]. Of the issue of the vineyard, he gives no account, because there were no grapes this year, and of 5d. of herbage sold in the vineyard as contained in the same.

29 See *Hebrew Deeds of English Jews before 1290*, edited by M. D. Davis (London, etc. 80, 1888), p. 368.

30 *Cartularium Monasterii Sancti Johannis Baptistæ de Colecestria*, edited by S. A. Moore (London, Roxburgh Club, 2 vols.). I am indebted to Mr. George Rickword, Librarian of the Public Library at Colchester, for kindly calling my attention to this and other Colchester entries.

31 See Harrod's *Calendar of Colchester Court Rolls* (Colchester, 4^o, 1865), p. 24.

At the end of the Thirteenth Century, there appear to have been, in the parish of Witham, fields or parcels of land known respectively as Over and Nether Winefield, or Winesfield, or Winesland, which probably were or had been vineyards. These are referred to in several deeds recently printed.³²

The late Dr. J. E. Thorold-Rogers has recorded³³ that, in a terrier of the rents of Barking Abbey, dated 1540, he found the following entry:—

“Item: a vineyard, empaled with elmes, well stored with vines, by estimacon 5 acres.—[rent] 20 shillings.”

As late as the year 1667, Admiral Sir William Batten vinted the produce of the vines growing in his beautiful garden, at Walthamstow, where he had his country house.³⁴ Pepys, referring to the taking of some prizes by a ship in which he and Batten both had an interest, says, on July 17th 1667³⁵:—

“I at Sir W. Batten’s [where I] did hear the particulars of “it; and there, for joy, he did give the company that were “there a bottle or two of his own last year’s wine, growing “at Walthamstow; than which the whole company said they “never drank better foreign wine in their lives.”

Doubtless careful search through early records would bring to light many other instances of the existence of vineyards in Essex in former days. Indeed, it seems probable that, from the time of Domesday Book onwards, the residence of each of the great Norman lords and all the great monasteries had a vineyard attached to it almost as a matter of course. At the same time, it is practically certain (as Sir Henry Ellis has already remarked³⁶) that at no time were English vineyards sufficiently numerous and extensive to produce the quantity of wine needed to meet the home demand, which had, therefore, to be supplemented by wine imported from other countries.

Various reasons may be advanced to account for the discontinuance of viniculture in Essex – or, for the matter of that, in the south of England generally. Most people would, no doubt, attribute it to a marked deterioration of the climate of this country which they believe to have taken place since the time of the Romans. A belief in such a deterioration of our climate

³² See the *Chartulary of St. John’s Abbey, Colchester*, pp. 481-486.

³³ *Notes and Queries*, Jan. 10th, 1885.

³⁴ Batten, who was Surveyor of the Navy, died Oct. 5th 1667.

³⁵ *Diary*, vol. iv. (1848), p. 122.

³⁶ *Gen. Intro. to Domesday Book*, i., p. 121.

is very prevalent, and I am inclined to believe that it is well founded, though it is obviously almost impossible to obtain tangible and conclusive evidence by means of which such a belief may be tested. It is almost certain, however, that such a change in climate has taken place, within historic times, in some of the other countries surrounding the North Atlantic—namely Iceland and Greenland. In the case of Greenland, it would now be impossible to maintain there such settlements as we know for a certainty were maintained at Kakortok, and elsewhere on the west coast, by the Scandinavians, in the Eleventh and Twelfth Centuries. Then, as regards Iceland, there are several reasons for thinking that its climate has deteriorated since mediæval times. Ivar Bardsen, a Greenlander, who, in the Fourteenth Century, wrote a description of Greenland, says³⁷ that, even then, the ice lying in the sea between Iceland and Greenland had increased so greatly that it was impossible to sail the ancient route to Greenland, due west from Snaefjeldnes in Iceland; while Captain Graah has declared³⁸ that this ice is still continually on the increase on the east coast of Greenland, thereby necessitating its thin population to emigrate to the west side. The Norwegian glaciers, too, are said to be extending noticeably. Many other facts pointing in the same direction might be cited; and it can hardly be doubted that the British Isles have shared in this general deterioration of climate which seems to have gone on over the North Atlantic within historic times.

It is, however, by no means necessary to show that the climate of this country has changed for the worse within historic times in order to account for the discontinuance of viniculture with us. Whether such a change has taken place or not, and whether it has rendered viniculture here more difficult or not, it is probable that the discontinuance of viniculture in Essex was due to another cause altogether—namely, to the steady improvement in the means of transport and of communication with other parts of the world, which gradually rendered it less and less remunerative to cultivate the vine in regions certainly not specially adapted to it, and in which it is not indigenous, when better wine could be imported at comparatively small cost from more favoured countries, further south.

³⁷ See Major's *Voyages of the Zeni* (Hakluyt Society, 1874), pp. 39-40.

³⁸ *Narrative of an Expedition to the East Coast of Greenland, . . . under the command of Capt. W. A. Graah, of the Danish Royal Navy, . . . translated by C. G. MacDougall* (Lond., 8°, 1837), p. 115.

Much the same reason, rather than any change in climate, has led to the discontinuance in this county of hop-growing—once a considerable industry with us. There is not now, I believe, a single hop-garden in Essex. Yet, twenty years ago, there were several; and, at an earlier date, there were many. Of this, we have abundant evidence in the large number of fields and meadows in all parts of the county which still bear the name “the Hop-garden,” the “Hop-field,” or the “Hop-ground,” as reference to Mr. Waller’s list of “Essex Field Names” (already referred to) will show. I myself well remember the hop-ground at Tye Hall, Roxwell, the use of which was discontinued in 1883, and I believe that a hop-garden (the last in Essex) continued in use at Castle Hedingham until a still later date. “The Hop-pole,” once a common inn sign, still lingers at Good Easter, Great Hallingbury, Little Hallingbury, and Roydon.

It can hardly be supposed that any change in the climate during the last twenty, or even the last hundred, years accounts for the abandonment of hop-growing in Essex. Without doubt, it is due to improvement in the means of transport, brought about by the introduction of railroads, which has made the produce of the more favoured hop-lands of Kent and East-Sussex as easily obtainable in any part of Essex as that grown in an adjoining parish was a century ago, and has also put an end to the practice of home-brewing, which was carried on at every good farmhouse in Essex up to eighty or a hundred years ago. Just so it has been with our Essex wine-growing and wine-making industry. The only difference is that our wine-making industry was unable to compete with the produce of foreign countries, while our hop-growing industry was unable to compete with that of other parts of our own country.

There is no evidence, so far as I am aware, to show the date at which viniculture was abandoned in Essex. It may have been continued in isolated spots until a comparatively-recent date. This seems, indeed, to have been certainly the case at Barking, where a vineyard still existed (according to a record already cited) as late as 1540. The fact that a vineyard was attached to Ingatestone Hall, which was only erected in 1565, renders it probable that viniculture was there carried on still later. Then, too, we know that Sir William Batten made wine from grapes at Walthamstow in 1667.

There can be little doubt, however, that viniculture, as a regular industry, had begun to decline, not only in Essex, but throughout the whole south of England, soon after the time when more or less regular commercial intercourse was opened up with the chief wine-producing countries of South-western Europe. This may be said to have taken place about the beginning or middle of the fourteenth century. It is known that a voyage to England was one of the six annual trading voyages sent out under the auspices of the Senate of Venice at this period, and that wine, spices, and drugs were among the commodities sent to this country to be exchanged for cloths, hides, and tin. The "Flanders Voyage" (as it was called), during which England was visited, was regarded as the most important of these six annual voyages and was made regularly, in each ordinary year, from 1317 to 1533. On the list of those who commanded each year appear some of the noblest names in Venetian history.³⁹ Owing to the great commercial enterprise of the merchant-seamen of Venice, it may be doubted whether the inhabitants of wine-producing countries much nearer England, such as France and Spain, commenced to supply us regularly with wine in any large quantities at an earlier date than the Venetians. On this point, however, it is impossible to do much more than hazard a few surmises.

Be the cause of the discontinuance of wine-making in Essex what it may, it is certain that viticulture, as distinguished from viniculture (the culture of the vine, that is, for the sake of grapes themselves, rather than for the sake of the wine the grapes will yield), is still possible, in the open air, in Essex. There is scarcely an old farmhouse throughout the county which has not a vine trained against some outer wall, either of the house itself or of an adjacent out-building, while the same may be said of many labourers' cottages in rural parts of the county. In any ordinary year, these vines ripen their grapes fairly well and they are quite palatable, especially, of course, in such hot summers as those of 1887 and 1898. Still, now and then there comes a summer in which the grapes fail to ripen altogether or only do so very imperfectly. A case in point was the summer of 1879—one of the most wet and sunless of the present century—when, as I find recorded in my journal, it was most noticeable that "out-

³⁹ Much additional information as to the importance, both to England and Venice, of this annual "Flanders Voyage" is to be found in Mr. Rawdon Brown's preface to the *Calendar of State Papers and Manuscripts (Venetian) relating to English Affairs*, vol. 1, 1202-1509 (London, 8^o, 1864).

door grapes have nowhere ripened, being on the average no bigger than large peas, and are as sour as can be." As a rule, however, growers of these outdoor grapes have, in Essex, much less to fear from the deficiencies of our climate than from the wasps, which attack the grapes with avidity as soon as they begin to ripen.

Nevertheless, as has already been said, there seems room for doubt whether our Essex climate is now good enough to ripen, in an average year, grapes sufficiently for the purposes of wine making. It is one thing for a few grapes to ripen when produced by a vine trained to a brick wall which catches and reflects all possible rays of the sun's heat; but it is quite another thing for grapes to ripen when grown upon poles in vineyards in the only manner possible when the grapes are required in large quantities for wine-making.

The foregoing does not profess to be anything like a complete review of the subject treated. Further research would bring to light many other old records and interesting forgotten facts tending to elucidate the subject; but enough has been said to establish the fact that, in early times, viniculture was carried on more or less extensively in our county.⁴⁰

⁴⁰ I have to thank Mr. Bickley, of the British Museum, and Mr. William Cole, F.L.S., for kind assistance and advice in reference to portions of the foregoing paper.

WARRANT FOR PAYMENT OF FOREST OFFICERS IN 1728.

By I. CHALKLEY GOULD.

[Read February 25th, 1899].

THE presentation of this document to the Epping Forest Museum by Mr. Brown enables us to compare it with a similar Exchequer Order, dated the 14th January, 1741, already in our collection and exhibited at Chingford.

The description given of that document in *THE ESSEX NATURALIST* (vol. ix., p. 73) renders it unnecessary to do more than indicate the points of difference presented by our new acquisition.

It will be seen that this warrant is of earlier date, *viz.*, 30th October, 1728, and opens with the order to pay out of "his

Matys Treasure" unto Richard Viscount Castlemain, "Warden of his Mats. fforest of Waltham," the sum of £67 10s. "to be distributed amongst the officers of the said fforest hereafter named for the quarter ended at Michs. 1728."

It is of local interest to note that this order though in favour of the same individual as the 1741 warrant (as Warden of the Forest) was written when he was known as Viscount Castlemain. Sir Richard Child obtained this title in 1718 but did not attain the dignity of Earl Tylney till 1730.

The un-named Chief Ranger, who has £2 10s. as his quarter's allowance, was, no doubt, John Goodere, Esq., who seems to have held that office, with all its perquisites, for the long period from 1722 to 1757. The total sum to be disbursed and the allocation of the salaries are the same as in the later order but in naming the various walks into which the forest was divided we find "Leighton, Walwood, and Homefrith"; thus adding *Walwood* to the forest place-names.

This warrant has, unfortunately, been so mutilated so that we have now no signature of the minister at foot, nor of the examining clerks at the side as in the document of 1741. On the back is the signature *Castlemain* owning receipt in full on the 3rd January, 1728 (1729 according to modern style).

Though not, perhaps, of great importance these documents are very interesting as they show something of the methods of administration of the affairs of the forest, and they may be useful hereafter should anyone endeavour to add to the information to be found in Fisher's *Forest of Esscx* (1887).

[By the kindness of Mr. Gould, the above document has been very neatly framed for exhibition in the Museum together with the former Order presented by him in March, 1895.—ED.]

NOTES OF A DEMONSTRATION ON PRIMITIVE FIRE-MAKING APPLIANCES.

[BY EDWARD LOVETT.]

[At the meeting of the Club on December 17th, 1898 (E. N., vol. x., pp. 410-11), Mr. Edward Lovett, the well-known student of "survivals" of early implements and handicrafts, gave a lecture or demonstration on methods of obtaining fire, an abstract of which, in his own words, we are enabled by his courtesy to give here] :—

In response to the invitation of your worthy Secretary, I have brought for exhibition and description a few typical examples of primitive Fire-making Appliances from my somewhat extensive collection of these interesting objects.

Before describing these in detail it would be as well to briefly introduce the subject. The modern chemical method of getting fire by means of articles is an invention as of but yesterday, compared with the enormous antiquity of making fire by *mechanical means*.

These mechanical modes were (and are) as far as we know, of three kinds — *viz.*, by (1) Friction, (2) Percussion, and (3) Compression. Of these the oldest and by far the most generally distributed is that by *Friction*.

The apparatus consists usually of two pieces of wood: one of these is the rubber and is composed of a hard wood; while the other or "hearth" is of a softer kind. Sometimes the rubber is worked up and down a groove in the "hearth," as was the apparatus in vogue among the Hottentots and in some parts of South Africa; while in the general way the rubber is twirled in a hole in the softer piece of wood.

Many of the North American Indian tribes made fire in this way; as also did the Eskimos; so did many of the African natives, as well as the Veddas of Ceylon and the Bheels of Central India.

The usual method of working this Fire-drill was by twirling it between the hands; two operators were required to keep the motion on till fire comes, for any pause is fatal to getting fire. The Eskimo people seem to have hit upon some clever devices: one of these is the Bow-drill. The operator holds the drill down, with a stone-lined cap, with one hand; whilst with the other he works, saw-like, a bow of walrus ivory, the thong of which takes a turn round the drill stick.

Another way is with a bare thong worked by one man from side to side, whilst another man holds down the drill. Yet another is, where the thong is worked by the same man who holds the pressing cap in his teeth. Considering the enormous *drag* on a fire-drill, these men must have good teeth and strong jaws!

The Bheels of India use the drill, the wood of *Tectona grandis*, and the "hearth" is made of the *Ziziphus jujuba*.

The Somalis use a similar form, but the wood is unknown to me.

The Pump-drill, a form of enormous antiquity, was in common use among the Zuni Indians, while some of the Oriental primitive races used two pieces of bamboo with a curious sawing process.

In all these examples what takes place is practically the same, and it is this. The rubber or drill being of hard wood rubs off fine particles of the softer wood, which are of course rendered very hot in the process. This hot wood dust coming into contact with the oxygen of the air, ignites, and smoulders, and can soon by the aid of a little dry moss kindle a flame.

It will be noticed that in all the "hearths" exhibited there is a little notch at the side of the hollow in which the drill revolves; this is to admit the air to the heated wood dust which could not otherwise ignite.

The method of obtaining fire by *Compression* is so limited that we may dispose of it before proceeding to the much greater subjects of percussion. Indeed the compression tube has been used in Europe as a scientific toy, and it is therefore very surprising to find it used by such a people as the Shans for the very practical purpose of getting fire. Their apparatus consists of a flask-shaped box of very hard wood, into which a sort of piston rod, also of wood, fits, at the one end of this is a hollow for holding a bit of very dry

tinder, the other end terminates in a flat knob. When the box is held in one hand, the piston in position is driven by a smart blow on the knob by the other hand; this of course compresses the air in the cavity in the box, and great heat is suddenly generated. By withdrawing the rod quickly the heated tinder is brought into contact with the oxygen of the air outside, and it ignites, or should do under favourable conditions.

We now come to the *Percussion Method*, by which we mean the general use of flint and steel, with their many and varied forms and ramifications.

For the earliest examples of the Flint-and-Steel we must go back to the Stone-age where flint and iron pyrites took the place of the more modern form; indeed, I have heard of cases where iron pyrites has been used for getting fire even during the present century. In different countries we get variation in the forms of the steels, and various silicate stones taking the place of the flint. The box or receptacle for the tinder and the flint and stone also vary geographically, as also does the tinder used to arrest and hold the precious spark.

I will now describe a few of these from various parts of the world, taking it for granted that we all know that this method of getting fire is simply that the hard flint, or allied stone, by being brought sharply into contact with a piece of soft steel or iron, strikes off a particle of the latter, which being heated by the force employed burns in the oxygen of the air, and that this spark falling upon very dry tinder ignites it, and thus furnishes the desired fire.

Some of the most primitive of these forms in my collection are curiously enough from India. In one case the steel is a rough fragment of iron, the flint a rude flake of agate, the tinder is the silky lining of the seed vessel of the *Bombax malabaricus*, and the tinder box is the hallowed fruit of the Borassus Fan-palm.

In another the tinder box is actually made from the cocoon of the Tussore silk moth, and the flint is from an old "Brown Bess" gun of the Mutiny times. In Northern India chalcedony in rough lumps does duty for the flints in company with almost impossible pieces of hard white iron.

Several examples from Thibet show the typical pouch-shaped tinder case having the steel fixed as a rim to the lower edge. This form is common in Thibet, Persia, China, Kashmir, and North Africa, and we actually have a modification of it from Norway, Germany, and our own country, England.

From the Punjab, India, we have the native's pipe and tobacco, with flint and steel and tinder, all together in a rough canvas bag, while in the West Indies we find a cow's horn doing duty as a tinder box.

To come down to modern civilized times we have from Germany and Scandinavia, tinder boxes cut from solid blocks of wood; their English representatives were of *joined* wood. In Holland, to-day, tinder boxes and flints and steel are sold in the streets for a few centas each: the former are small rounded tubular boxes of copper or brass, but are not to be compared with their artistic ancestors of the 17th century, of which we have several before us. We also have many forms of pocket tinder boxes, some being of silver, having the steel attached to one of the outside edges.

The typical English tinder-box is of circular form, made of thin iron, sometimes japanned, more often not. The tinder, which was of some charred

cotton material, was covered by the damper, a disc of metal with a small handle or ring to hold it by. Upon this rested the flints and steel when not in use and a lid bearing a candle socket shut the whole up. I have seen this form of tinder-box in zinc and lead.

The elaboration of appliances in due time produced the trigger or pistol tinder-box. This was in Europe, a sort of modification of the flint-lock pistol in which the barrel was left out and the powder pan developed into a box for the tinder. The examples which I show of this form, are from this country, Scotland, Sweden, France, and North Germany. It may be observed that while the general principle is the same in all, each specimen bears the artistic stamp of the country to which it belongs; the English example being the most solid and substantial in its structure. From Japan I have two or three very artistic and small forms of this apparatus dating back to the 17th century. This dainty contrivance is enclosed in a small metal case of much beauty, scarcely so large as a walnut.

With the dawn of chemical methods of making fire, we bid adieu to the tinder-boxes and fire-drills with all their artistic originality and interest; and find ourselves with the useful and simple, but severely uninteresting matches and match-boxes of the present day.

NOTES—ORIGINAL AND SELECTED.

ZOOLOGY.

MAMMALIA.

Fox catching Woodcock.—Mr. William Stride, of Widdington, Essex, relates the following anecdote in the *Field* of March 14th:—"The Puckeridge Hounds met close to here on March 8th, and, in consequence, one of my men was out all the previous night stopping earths. The next day, when he went his rounds to unstop them, he found at the entrance to one of them a dead woodcock, with two newly-born rabbits under its wings, which the dog fox had evidently brought for the vixen, which was no doubt stopped in, and, finding he could get no further with them, put them down outside. As woodcocks are very scarce with us it seems a mystery how he caught it and where. I have heard of foxes taking almost anything, but never before heard of their taking woodcock, and I should like to know if any other instance has been heard of before."

Deer in Epping Forest—By order of the Epping Forest Committee a census of the Deer was again taken on the morning of the 30th of March, 1898. There were counted 148 Fallow Deer and 13 Roe Deer, and on the evening of the same day 162 Fallow and 23 Roe Deer. It was estimated that in the coverts of estates adjoining the Forest there were 16 Fallow and 15 Roe Deer. This shows a diminution of the numbers since the census taken in 1897 (see *ESSEX NATURALIST*, vol. x., p. 292), but the Forest deer are such adepts at concealing themselves that but little value can be attached to negative evidence.

AVES.

Bird Life in Epping Forest and New Forest in the Spring.—Mr. Frank Brown writes as follows in the *Field* of March 11th:—"Some months since you advised a correspondent who was desirous of studying bird-life to visit Epping in preference to the New Forest, birds being more numerous in the former, and my experience certainly supports your assertion. Perhaps you may deem a brief account of a visit I paid to Epping Forest on Sunday last (March 5th, 1899), of sufficient interest to place before your ornithological readers. Leaving the train at Highams Park station, I made my way to the lake, and in a few minutes had on my list of birds the rook, jackdaw, starling, oxeye, tit, and wren. At the waterside I had a most pleasing surprise. A small bird of a greenish-yellow colour rose at my feet, and joined its companions in the branches of an adjacent alder tree. Not being sure of its species, I brought my field-glass to bear on them, and found they were siskins, the first time I had met with this bird in the forest. Moorhens abounded, no less than nine being on the bank, one of them minus a foot, but this did not seem to cause the bird any inconvenience, the stump being freely used as it followed its fellows to the water, where it swam with one foot. Passing on towards Chingford I noted a tree-creeper, long tailed titmouse (a solitary specimen), hedge sparrow, chaffinch, mistle thrush, song thrush, blackbird, and wood pigeon. The cheery spring note of the nuthatch came from the summit of an elm by the roadside, and not far off the laughing cry of the green woodpecker could be heard, nor was it long before I had the pleasure of seeing its lovely plumage and noting its characteristic flight. Connaught Water brought wild duck within my ken, and a carrion crow on a tree near by was, no doubt, keeping a look out for a early egg. In Monk's Wood I had the good fortune to get within range of a hawfinch. Generally speaking, this bird is extremely shy, confining itself to the summits of the leftiest trees. Robin redbreast was singing his plaintive ditty to the setting sun as I made my way to the Foresters' Arms for a cup of tea, and a little band of blue tits, with a marsh tit among them, sought shelter for the night in a protective blackthorn bush. As I reluctantly left this glorious woodland I heard the woodowl calling to the night, and blessed him for his quaint and eerie cry." The Editor of the *Field* remarks thus on Mr. Brown's communication:—"By a curious coincidence, on the very day on which our correspondent was making the above mentioned observations in Epping Forest we were rambling round Lyndhurst Hill and Butts' Lawn, in the New Forest, where, having in mind the recently published allegation that bird-life in the New Forest is conspicuously absent, we noted the appearance of the following species:—Nuthatch, pied wagtail, meadow pipit, thrush, blackbird, mistle thrush, starling, chaffinch, woodpigeon, green woodpecker, greater spotted woodpecker, great tit, blue tit, marsh tit, jay, sparrowhawk, rook, robin, hedgesparrow, and wren. The time of year, of course, was not favourable for the observation of many species, for none of the summer migratory birds were there. Had it been otherwise the list of species would have been much longer."

Stone-Curlew or "Thick-knee" at Fowlness Island.—Mr. H. M. Matthews, of Fowlness Island, wrote as follows to Dr. Laver, under date March 24th, 1899:—"With this please receive a bird, name to me unknown, excepting as apparently belonging to the plovers. It was picked up yesterday

only just alive, on the sea-wall or saltings by a lad named Nichols. It was alive when brought to me, but died in the night, it seemed to be starved. . . . Perhaps the late rough cold weather caused its death." Dr. Laver identifies the bird as the Thick-Knee or Norfolk Plover (*Edicnemus scolopax*). Mr. Matthams adds that a Thick-knee was brought in several years ago to him, but that no other person on the Island had ever seen a specimen. [Dr. Laver has kindly ordered this bird to be stuffed for presentation to the Club's Museum.—ED.]

INSECTA.

Gnorimus Nobilis in Epping Forest.—With reference to Mr. Cole's remark at the meeting of Dec. 17th, 1898, that he once found a specimen of *Gnorimus nobilis* in Lord's Bushes, which "had possibly been introduced" among the roots of imported plants (ESSEX NATURALIST, vol. x., p. 411) it may be of interest to record that I captured a specimen of this beautiful beetle at Loughton in 1880, in an open glade in the Forest about two miles north east of that village. My specimen was captured in full flight on a bright sunny day; as the beetle is very active, and flies readily, it is scarcely likely to be imported in the manner suggested; and its occurrence in two places some distance apart, presumably at different dates, would point to the conclusion that it is indigenous to the Forest. In agility when on its legs, and in speed when flying, there is as much difference between *G. nobilis* and its congener, the common Rose-beetle (*Cetonia aurata*), as there is between a cart horse and hunter.—J. O. BRAITHWAITE, Clooneaven, Chingford, Essex.

Slab-shaped Nest of Vespa Germanica.—I have acquired a rather interesting specimen of a wasps' nest. It comes from the house called, I think, the "Wellington Inn," near High Beach. It is a slab nearly square, approximately 15in. by 12in. and about four thick. It is in three layers of comb, and among the cells are a few fragments of wasps, which may be sufficient to determine the species. The shape of the nest was evidently controlled by its situation—the side of the house, between two posts, I was told. I shall be happy to present the nest to the Museum.—S. ARTHUR SEWELL, F.R.H.S., Buckhurst Hill, March 15th, 1899. [Mr. Edward Saunders, F.L.S., has kindly given his opinion that the fragments of wasps we sent to him belonged to the workers of *Vespa germanica*. The nest is now in the Museum Mr. Sewell's courtesy.—ED.]

CRUSTACEA.

Crab carrying an Oyster on its Shell.—Mr. W. B. Tegetmeier, F.L.S., records the following incident in the *Field* for December 17th, 1898:—"I have received from Mr. A. H. Went, of West Mersea, near Colchester, a very interesting specimen of a crab bearing on its shell a two-year-old oyster. These conjoined animals are not merely curious, but they are of interest as affording some data as to the rate of growth of the two species. The oyster must have been attached to the crab for two years, during which time the latter could not have cast its shell, which was 2½in. wide at the broadest part, the greatest width of the oyster being 1½in. This specimen recalled to my remembrance an anecdote recorded of a very well-known inspector of fisheries, who, when talking to the fishermen on the beach, told them that they could help very much in scientific observations if they chose to do so. 'When you catch a small crab in your nets, you throw him over, and that's the end of

him ; but if you were to make a mark on his shell with your knife, then, when you caught him again, you would see how much he had grown in the time, which we want to know.' Whereupon an old salt looked up at the learned official and remarked, ' Don't yer know, measter, as they shoots their shells every year?' An awkward interrogation for Her Majesty's Inspector."

BOTANY.

"The Existing Trees and Shrubs of Epping Forest" (See *ESSEX NATURALIST*, vol. x., pp. 377-387).—*Ligustrum vulgare*, L. To the one bush mentioned in my list, I can now add some more Privet higher up the Ching Valley, in a thicket near the north end of the red path.

Taxus baccata, L. I regret to say that the specimen mentioned as growing near the great oak was, during the latter part of the winter, uprooted and removed by some rascally thief. So far as I know we are now without any yew tree not artificially planted. — F. W. ELLIOTT, Buckhurst Hill, April, 1899.

Fasciation in the Holly in Epping Forest.—"Fasciation" is the technical term for the abnormal arrangement of the shoots of plants in "fasces" or bundles. This occurs occasionally, but not so far as I know, very generally. I have examples in the Daisy, also in a Buttercup in which many stalks have been joined together, in some cases to the width of an inch. It appears from my observations in Epping Forest that this habit obtains somewhat frequently in the Holly, and I have specimens in which the shoots, as many as 50 or 60 in number, are joined together. When this is the case, the stem instead of being round, is quite flat, and I have noticed that nearly each stem has a separate leaflet. The enlargement begins sometimes at the middle part of the stem, and then all the subsidiary branches are fasciated to the top.—S. ARTHUR SEWELL, Buckhurst Hill. [Mr. Sewell has kindly presented a specimen to our Herbarium.]

Mistletoe on Hornbeam in Epping Forest.—Being known as a naturalist I often have my attention drawn by keepers and others to various matters connected with natural history. To this I must attribute the fact that I was taken into the Forest to see a small shoot of the Mistletoe growing on a Hornbeam. Certainly it was there, but there was not enough, even if I had been inclined to do so, to take a specimen.—S. ARTHUR SEWELL, "Maplestead," Buckhurst Hill. [The occurrence of the Mistletoe on the Hornbeam must be rare, as we cannot find an instance recorded in any "Flora" to which we have access. In Essex it is generally found on Apple and sometimes (as in Hatfield Forest) on Hawthorn.—ED.]

GEOLOGY.

Chalky Boulder Clay in Epping Forest.—Walking down the road from Abridge to Theydon Bois station in the beginning of November last, I found that the right hand side of the road at Parsonage Farm, about a quarter of a mile from the station, had just been dug up and filled in with gravel for several yards past the farm, and that a quantity of Chalky Boulder Clay had been dug out and was lying in heaps at the side of the road. I was told that this was found under the gravel in the trench, but as this was filled in I could not get a section. In the Geological Survey Map the Boulder Clay is shown up to

the farm on the opposite side. I have only once before been able to find the clay within our forest boundary—viz., at Great Parndon. Mr. T. V. Holmes found it near Ilford, and a line drawn from near Ilford to Great Parndon passes close to the spot mentioned above. I have placed a sample of the deposit in the Forest Museum.—T. HAY WILSON. [At one of the early Field Meetings of the Club at Theydon Bois in September, 1880, a section of the Chalky Boulder Clay was noticed in the lane leading from Theydon Bois station to the Church, presumably at or near Mr. Wilson's position. See *Journal of Proceedings, E.F.C.*, vol. 1, page xli.—ED.]

Tufa-forming Stream near Epping.—Mr. H. Bernard Kemsley, of "Allendale," Epping, a student at Loughton School, has brought up for the Museum a very nice specimen of Tufa or Travertine produced by a small tributary of the Cobbin Brook, and has furnished the following particulars:—"The stream is situated in a ploughed field on "Takeleys Farm," Epping, belonging to Mr. Kemsley. About three years ago, the field being very wet, a drain was cut down the middle, and it was found that the soil was very hard near the Cobbin Brook (into which the stream now runs) owing to the presence of lime. At the spot where the drain pipes come out at the brook there is a heap of this limy concretion deposited from the water and the pipes have about a quarter of an inch of 'fur' in them. The position is about 500 yards from Epping Old Church, on the right hand side of the road going to the Church and about 100 yards on the margin of the brook from the bridge." The sample presented by Mr. Kemsley consists of twigs and leaves cemented together by the lime salt (apparently principally carbonate). No shells can be seen in the travertine, but it will be remembered that it was on a deposit of carbonate of lime laid by a spring at Stebbing Ford, that Mr. French found *Cyclostoma elegans* in a living state in Essex (ESSEX NATURALIST, vol. iv., pp. 92-93). Mr. Kemsley should search the locality for molluscs.—ED.

MISCELLANEA.

Fairmead Lodge, Epping Forest.—As was stated in a foot-note on page 296 of the last volume (vol. x.), Fairmead Lodge had disappeared from the Forest. The reasons for its removal are thus stated in the last Report of the Epping Forest Committee (9th February, 1899):—"Referring to our last Annual Report, in which we stated that we had instructed Mr. Surveyor to consider whether it was possible to adapt Fairmead Lodge, or any portion thereof, as a keeper's residence, we have to report that Mr. Surveyor was of opinion that it would cost £200 to make the Lodge or the adjoining tea-shed habitable. We therefore resolved to remove the buildings, and advertised for tenders from persons willing to purchase and take away the materials. The highest tender received was that of Mr. James Bailey for the sum of £50, which we accepted, and the whole of the buildings have been pulled down and removed, and the site restored to the Forest."

ORDINARY (SCIENTIFIC) MEETINGS are held at frequent intervals for the reading of papers and the exhibition of specimens, etc., and FIELD MEETINGS are arranged during the summer months, and held in various parts of the County under the guidance of experienced Naturalists, Geologists, and Archæologists.

The Club has carried on several SPECIAL INVESTIGATIONS—*e.g.*, the examination of the two EPPING FOREST CAMPS, an EXPLORATION of the DENEHOLES, the "RED-HILLS," etc., and has published several valuable REPORTS, illustrated with plans and maps. Considerable efforts have been made to catalogue the FAUNA and FLORA of the County, and it is wished to extend this work as funds and opportunities will permit, particularly in the direction of a systematic Exploration of MARINE and ESTUARINE forms of life by DREDGING, etc., and their preparation and preservation in the Essex Museum, for future reference and study.

Although bearing a county title, *the Club offers exceptional advantages to Metropolitan residents.* Many parts of Essex are but little known, although of the greatest interest to the naturalist, geologist, and antiquary, and the Museums and Libraries at Stratford (at which place a large proportion of the "Winter Meetings" are held) and Chingford, bring the Club into close touch with London naturalists.

Very considerable material has been accumulated towards a LOCAL and EDUCATIONAL MUSEUM, which will shortly be established in a handsome building at Stratford (by the generosity of Mr. Passmore Edwards, and in conjunction with the Corporation of West Ham) to form a home for County collections and specimens, where they may be consulted by all interested in Essex. A BRANCH MUSEUM to illustrate the Natural History and Archæology of EPPING FOREST has been established (under the sanction of the Corporation of London) in QUEEN ELIZABETH'S LODGE, CHINGFORD, which has proved very attractive to thousands of visitors to the Forest. Greatly increased space for the Museum will soon be accorded at the Lodge, the Corporation of London having voted at least £750 for the restoration and adaptation of the building.

The Club already possesses a good nucleus of a Local and Scientific LIBRARY, which has been obtained by donations, exchanges, and purchase.

The *Minimum* SUBSCRIPTION is Fifteen Shillings per annum, payable upon election, and afterwards on the 1st January in each year. The usual entrance fee is at present in abeyance. The LIFE COMPOSITION is £10 10s. in one payment. *Members can purchase the publications of the Club at a Discount of 25 per cent. from the published prices.*

Copies of the RULES, FORMS of PROPOSAL for MEMBERSHIP, together with specimen copies of the ESSEX NATURALIST, and other information, will be gladly sent on application to the *Hon. Secretaries*, Messrs. W. and B. G. COLE, Buckhurst Hill, Essex.

N.B.—All communications of a financial nature, SUBSCRIPTIONS, DONATIONS to the MUSEUM and LIBRARY FUND, etc., should be sent to the *Treasurer*, W. C. WALLER, Esq., Loughton, Essex; communications relating to the LIBRARY, and Donations of Books and Pamphlets, and SPECIMENS for THE MUSEUM should, at present, be sent to the temporary premises, 9, Woodgrange Road, Forest Gate, Essex, marked "Essex Field Club."

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"Stubbers," Romford, Essex.

This Society has been formed for the Protection of Wild Birds, by enforcing the existing laws; by rewarding successful prosecutions; or by any action that may be desirable in special cases.

The formation of the Epping Forest Bird-Sanctuary is an instance of what may be accomplished by private effort. The measures already taken by the Society have in all probability prevented the extinction of the shore-breeding birds. Membership consists in a subscription of not less than 2s. 6d. yearly to the funds of the Society. All who are interested in Birds in our County are requested to join the Society.

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EDITED BY
WILLIAM COLE, F.L.S., F.E.S.,
Honorary Secretary and Curator.

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All interested in Essex and in the encouragement of the study of practical Natural History and Geology, as well as in the cause of the establishment and progress of Local Museums, should apply to the Hon. Secretaries for detailed prospectus and forms of proposal for membership.

Readers are referred to the List of Publications set out on third page of wrapper.

In order to encourage new members of the Club and others to complete their sets, the Council has resolved that for a very limited time only, the cost of the set of 10 volumes of the *ESSEX NATURALIST* (1887-1898), now priced at £5 os. 6d. (unbound), shall be reduced to £2 to the public and £1 10s to Members. And that single volumes and parts (so far as they can be supplied) of the "Transactions," "Proceedings," and "Essex Naturalist" shall be sold (to Members only) at one-fourth the published price.

HISTORY OF ESSEX BOTANY.

By Prof. G. S. BOULGER, F.L.S., F.G.S., *Vice-President*.

PART I.

THE BOTANISTS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

A CLUB such as ours, the object of which is to record the Natural History of a county, must be interested in the gradual introduction of new plants and animals into the area it investigates, and in the growth of our knowledge concerning them. My present object is in the main the growth of our knowledge of the Essex Flora. It may be possible to some extent to separate the indigenous plants of the county from those introduced by man, and to discover approximately the dates of these additions to our objects of study. This I propose doing, on the lines of the valuable appendices in Mr. Gibson's *Flora*, in the fourth part of my paper. Perhaps also a good deal of matter of biographical interest might be collected with reference to botanists resident in Essex, whose work did not relate to the county; but, as I thought it advisable to limit my enquiry, it is a history of Essex Botany rather than of Essex plants, or of Botany in Essex.

It may be a subject of congratulation to us that this history of Essex Botany is conterminous with that of the science in Britain generally. We are not now concerned with plants that may have been introduced by Romans in the first century, by the missionaries in the seventh century, by Normans in the eleventh century, or by the monks during the following five hundred years,¹ nor with any records previous to the revival of learning in the sixteenth century. The history of Essex Botany begins with William Turner, justly styled "the Father of English Botany," for, though we have no distinct statement that Turner was ever himself in the county, he mentions four species as growing in Essex, and most of his records, unlike those of his successors, seem to have been the result of personal observation. Commencing then with Turner, I find that our subject divides itself chronologically into three divisions: first, the botanists of the sixteenth and seventeenth centuries, Turner, Gerard, Johnson, Parkinson, How, Robert Turner, Merrett, Ray,

¹ See "The Influence of Man upon the Flora of Essex," *Trans. Essex Field Club* iv, p. 13.

Morison, and Dale; secondly, those of the eighteenth century Blackstone, Thomas Martyn, Warner, Curtis and Robson, down to the year 1789, in which Gough's edition of Camden's *Britannia* was published, containing a list of Essex plants drawn up by the brothers Forster; and thirdly, the writers from that time, chiefly Edward Forster, George Stacey Gibson, and botanists recently deceased, or still living.

It is unnecessary for me to give a detailed biography of William Turner, for two such have already appeared of late years—one in Messrs. Trimen & Dyer's *Flora of Middlesex*,² pp. 364-8, the other yet more complete in Mr. B. D. Jackson's *fac-simile* reprint of the *Libellus de re herbaria novus*.³ Turner was born at Morpeth, in Northumberland, probably between 1510 and 1515, and was educated at Pembroke Hall, Cambridge; was B.A. in 1529-30, Fellow of his college in 1531, M.A. in 1533. In 1538 he published his *Libellus de re herbaria novus*,⁴ the earliest work meriting the title of botanical issued in England. It does not refer more than ten plants to county habitats, and these, with the exception of one Norfolk record, are all in Northumberland or Cambridgeshire. Having adopted the principles of the Reformation, he travelled through a good part of England preaching, was imprisoned, apparently for doing so "without a call," and subsequently banished. He passed a considerable time in Italy, studying Botany at Bologna, under Luca Ghini; took the degree of M.D., probably at Ferrara; visited the great Gesner at Zurich, and resided at Basel and Cologne. He issued various controversial religious pamphlets, and received money in common with other exiles, from his Cambridge friend and master in Greek, Nicholas Ridley. He returned to England in 1547, after travelling in Holland, and in 1548 published his second botanical work, *The names of herbes in Greke, Latin, English, Dutch and Frenche, wyth the commune names that Herbaries and Apotecaries use*, which rare and valuable little work has been admirably reprinted for the English Dialect Society, under the editorship of Mr. James Britten.⁵ It is dated from Syon, where he acted as physician to the Protector Somerset, and contains about sixty county records, nearly half of which are in Middlesex, chiefly

2 London (Hardwicke), 1869, 8vo., price 10s. 6d.

3 London, privately printed, 1877, 4to.

4 British Museum press-mark 7473 i. 7, 4to. Mr. Jackson's reprint, London, 187 privately printed.

5 London (Trübner), 1881, 8vo., price 6s. 6d.

about Syon, and none referring to Essex. In 1550 Turner was appointed Prebendary of York, and soon after Dean of Wells, being at the same time incorporated M.D. at Oxford. He was only ordained priest in 1552, by Ridley. In 1551 he published the first part of his *Herball*, but having to take to flight on the accession of Mary, the second part and the complete work in three parts⁶ appeared at Cologne in 1562 and 1568 respectively. They thus had the benefit of the woodcuts made for Fuchsius' octavo herbal of 1545, which probably belonged at that time to Arnold Birckman. In this Herbal of Turner's appear the first Essex records I have. They refer to *Ruscus aculeatus*, L., a *Tilia*, a Hellebore, probably *Helleborus viridis*, L., and to the Misseltoe (*Viscum album*, L.). Thus it happens that the little Butchers' Broom, which is so frequent in the Forest and in our other woodlands, is the first scientifically recorded Essex plant, and, as all four of these species occur in the second part of the Herbal, Essex Botany dates from 1562—exactly three centuries before the publication of Mr. Gibson's *Flora*. These four records of Turner have considerable botanical accuracy and interest.

"Ruscus," he says, "is named in Greke myrsine agria, that is myrtus sylvestris, in Barbarus latin bruscus, in English kneholme, or knehull,⁷ and of other Bucher broume, and of som Petigre. I never sawe it in Germany, therefore I know not the Dutche name of it. Ruscus called of Dioscorides Myrtus sylvestris hath a leafe lyke unto a myrtell tree, but broder, lyke in fashion unto a lance, sharp in the top. It hath a rounde fruyte in the middes of the lefe rede, when it is ripe with a harde kirkel within. The twigges are bowing lyke vinde braunches, which come out of the route, they are tough a cubit high, full of leaves, the routes are lyke unto grasse binding, tarte in taste and something bitter. This bushe groweth verry plenteously in Essex and in Kent, and in Barke shyre, but I could never se it in Germany."⁸

There is a figure of the plant annexed. He also gives (on p. 153) a very poor figure of a lime tree, with this text :

"Tilia is named in Greke philyra, in Duche ein Linden baume, in English a Lind tre. It groweth verry plenteously in Essekes in a parke within two mile from Colchester, in the possession of one maister Bogges, it is also very comon in high Germany and it groweth so far abrode ther that men set tables aboue in it, whereof som are so long that ten men maye sit well at one table, and yet rounge remaynyng inough for many other besyde the table."

Ray points out that Turner was in error in terming the species now known as *Tilia vulgaris*, Hayne, a native of Essex⁹ ;

⁶ Cologne, 1568, fol. British Museum press-mark, 447.g.2.

⁷ Still so called at Baddow.

⁸ Op. cit. part ii., p. 120. Previously recorded as English in the *Libellus* and from Kent in the *Names of Herbes*.

⁹ Ray. *Historia Plantarum*, II. p. 1694.

but he may here refer to *T. platyphyllos*, Scop.,¹⁰ and as usual takes no care to distinguish between indigenous and planted species. This is the earliest record of the genus in Britain.

What I take to be a record of *Helleborus viridis*, L., has no figure to it, and runs as follows (p. 160) :

"I dare not saye that ever I founde the righte black Hellebor, but thys I dare holde, that a man for defaut of it, maye use verry well that kinde of bear foot that goeth every yeare into the grounde, whereof groweth greate plentye in a parke besyde Colchester, and in the west parke besyde Morpeth."

In this determination I differ, on the grounds of *Helleborus viridis* both being wild and having annual stems, from Pulteney, who in his MSS. considers *H. fatidus*, L., to be referred to,¹¹ and from my friend Mr. B. D. Jackson, who in his edition of the *Libellus* (p. 12) amends his reference (p. 3) to *Veratrum nigrum*, L. of a plant "quam vulgus cantabrigiense vocat Bearefote" by referring it to *Helleborus niger*, L. I probably should also dissent from Mr. Britten's reference of the Bearfot or Consiligo of the *Names of herbes* to this latter exotic species.¹² The true explanation appears in Mr. Jackson's edition of Gerard's Catalogus,¹³ p. 36.¹⁴

On pp. 164-5. Turner gives the following interesting record of the mistletoe, with a very good figure of the plant.

"The best missel byrde lyme is . . . made of a certayn round fruyte that groweth in an oke, the leafe of the bushe, that beareth it, is iylke unto boxe. It groweth also in apple and crab trees and peare trees and other trees and somtyme at the rootes of som bushes. . . . This Missel doth grow no other wayes, but by ye sede in such places whereas byrdes have devoured the fruyt, and have [discharged it] in the tre. I never sawe more plentye of righte oke miscel, then Hugh Morgan shewed me in London. It was sente to hym oute of Essex: where as there is more plentye then in anye place of Englande that I have ben in."

10 Gerard gives a similar record (*Herball*, 1597, p. 1299): "Neare Colchester, and in many places amongst the highway leading from London to Heningham, in the Countie of Essex." Ray's correction runs as follows:—Turnerum & Gerardum errasse existimo cum in Essexia Angliæ hoc genus copiosè provenire aiunt, nam quamvis ipse Essexiæ incola sum, neque inibi neque alibi in Anglia Tiliam foeminam vulgarem platyphyllon sponte nascentem vidi. Quæ frequens in sepibus & sylvis apud nos invenitur Tilia est minore folio J.B. & aliorum." The frequency of this small-leaved Linden round Black Notley was noticed during our Field Meeting, 23rd July, 1898. The identity of the species, hitherto known as *T. cordata* Miller, *T. parvifolia* Ehrhart, or *T. ulmifolia* Scopoli, has been recently established by Mr. E. G. Baker (*Journal of Botany*, 1898, pp. 318-9).

11 *Flora Anglica abbreviata*, MS. in the Botanical Department, British Museum, gen. 760.

12 Op. cit. p. 94.

13 *A Catalogue of plants cultivated in the garden of John Gerard*. . . . edited with . . . a life of the author by B. D. Jackson (privately printed), London, 1876. 4to.

14 Mr. W. A. Clarke, F.L.S., in his *First Records of British Flowering Plants*, London, 1897. p. 7, also refers this record to *H. viridis*.

Though we now generally look on the apple orchards of the western counties as the main home of the misseltoe, there is still plenty in Essex, growing on a variety of trees, including, according to Mr. Gibson and his correspondents, the apple, elm, lime, sloe, willow and thorn; but, so far as I know, no longer on the oak in this county. Yet in 1771 Warner records it,¹⁵ not only on apple, pear, ash, lime, willow and elm, but

“ On an oak, between Woodford Row and The Bald Faced Stag, near the the Ten Mile Stone: and on several trees, many of them oaks, between Loughton and Mr. Conyers's, Copped Hall.”

This suggests ideas connecting the Forest not only with the Romano-British period of Ambresbury Banks—but with the pre-Christian days of Druidism.

Having returned to England at the accession of Elizabeth in 1558, Turner was reinstated in his Deanery, but in 1564 was suspended for nonconformity, in declining to adopt the prescribed ecclesiastical vestments. He then took up his residence in London, where he died in 1568, and was buried in St. Olave's, Hart Street.

In accordance with my intention of restricting this history to the workers in Essex Botany, I need do no more than mention Thomas Newton, a native of Presbury, Cheshire, who, after practising as a surgeon, became a schoolmaster at Little Ilford, and, in 1583, Rector of that parish. In 1587 he published *An Herball to the Bible*, translated from the Latin of the Dutch physician, Levinus Lemnius. Newton died at Little Ilford in May, 1607, and was buried in Ilford Church. (Pulteney, *Sketches of the Progress of Botany*, i., 108; Britten and Boulger, *Biographical Index*, 127.)

Essex Botany, however, owes far more than to Turner to the better known Elizabethan worthy, John Gerard. Here again Mr. B. D. Jackson's labours, in the work already quoted, render any detailed biography from me superfluous. John Gerard was born at Nantwich, in Cheshire, in 1545, was educated in a neighbouring school, was drawn at an early age to the study of medicine, and travelled, possibly as surgeon on a merchant vessel, in Demark, Sweden, Poland, and Russia. In 1577 he had charge of the gardens of Lord Burleigh, in the Strand, and at Theobalds in Hertfordshire, and either at this time or subsequently he seems to have practised as a Barber-Surgeon.

¹⁵ *Plantæ Woodfordienses*. London, Printed for the Author. 1771. 8vo.

In 1595 he was elected a member of the Court of Assistants of the Barber-Surgeons, and about this time he seems to have had a house and garden in Holborn, probably near Fetter Lane, the north side being occupied by the garden of Ely House, afterwards Sir Christopher Hatton's. In 1596 Gerard issued a catalogue of the plants growing in this garden, of which he issued a second edition in 1599, both editions having been edited in a most workmanlike manner by Mr. B. D. Jackson, to whom I am most deeply indebted for assistance of all kinds. In 1597 Gerard became Junior Warden of the Barber-Surgeons' Company, and issued his *Herball*,¹⁶ which is virtually an adaptation to England of the *Pemptades* of Dodoens (1583). Previous to the appearance of this Herbal there had appeared the *Stirpium Adversaria* of Pena and Lobel (1570) and the *Herbal*, translated from Dodoens by Henry Lyte (1578), both containing localities; but those of the latter work are mainly from the Dutch original or copied from Turner, whilst none of those in the former happen to be in Essex. Gerard's *Herball* contains more than 1,800 woodcuts, nearly all of which were those used in the *Eicones Stirpium* of Tabernæmontanus (1590), obtained from Frankfort for the purpose by the printer, Norton. In 1604 Gerard received a royal grant of a garden plot containing about two acres to the east of Somerset House, Strand, but in the following year he parted with his lease to Robert Cecil, Earl of Salisbury. In 1608 he became Master of the Barber-Surgeons' Company, but in February, 1612, he died and was buried in St. Andrews', Holborn. The *Herball* enumerates about 75 plants from Essex, of which two or three are escapes from cultivation, about as many seem to be blunders, and the record of *Ruscus* is taken from Turner. Of the rest some cannot be determined with certainty, but in the first appendix to his *Flora* Mr. Gibson only enumerates the following 43 species as first mentioned by Gerard:—

<i>Clematis vitalba.</i>	<i>Cynoglossum montanum.</i>
<i>Myosurus minimus.</i>	<i>Linaria elatine.</i>
[<i>Sisymbrium polyceratium.</i>]	<i>L. spuria.</i>
<i>Crambe maritima.</i>	<i>Lamium galeobdolon.</i>
<i>Althæa officinalis.</i>	<i>Galeopsis ladanum.</i>
<i>Tilia parvifolia.</i>	<i>Anagallis cærulea.</i>
<i>Hypericum androsænum.</i>	<i>Glaux maritima.</i>
<i>Melilotus officinalis.</i>	<i>Statice limonium.</i>

¹⁶ John Gerard. *Herball*. London. 1597. fol. 449. k. 4.

<i>Trifolium fragiferum.</i>	<i>Plantago maritima.</i>
<i>Astragalus glycyphyllos.</i>	<i>Euphorbia paralias.</i>
<i>Comarum palustre.</i>	<i>Paris quadrifolia.</i>
<i>Rosa spinosissima.</i>	<i>Listera ovata.</i>
<i>Eryngium maritimum.</i>	<i>Epipactis latifolia.</i>
<i>Peucedanum officinale.</i>	<i>Asparagus officinalis.</i>
<i>Dipsacus pilosus.</i>	<i>Convallaria majalis.</i>
<i>Aster tripolium.</i>	<i>Ruscus aculeatus.</i>
<i>Solidago virgaurea.</i>	<i>Actinocarpus damasonium.</i>
<i>Diotis maritima.</i>	<i>Sagittaria sagittifolia.</i>
[<i>Senecio saracenicus.</i>]	<i>Osmunda regalis.</i>
<i>Serratula tinctoria.</i>	<i>Botrychium lunaria.</i>
<i>Campanula glomerata.</i>	<i>Ophioglossum vulgatum</i>
<i>Convolvulus soldanella.</i>	

Of these *Ruscus aculeatus* and *Tilia parvifolia* (*T. platyphyllos*) were previously recorded by Turner. *Anagallis cærulea* and *Actinocarpus damasonium* are not in Gerard's work, but occur for the first time in Johnson's "emended" edition (1633); *Sisymbrium polyceratium* is certainly not indigenous and *Senecio saracenicus* is, as Johnson points out,¹⁷ probably a blunder. Mr. Gibson's *Appendix* professedly includes only the less common species. In the body of the *Flora*, the following 10 additional records from Gerard are alluded to; but unfortunately Mr. Gibson does not distinguish his quotations from Gerard's own work from those taken from Johnson's additions:—

<i>Glaucium luteum.</i>	<i>Gentiana cruciata.</i>
<i>Cochlearia anglica.</i>	<i>Plantago Coronopus.</i>
<i>Matthiola sinuata.</i>	<i>Populus alba.</i>
<i>Saxifraga granulata.</i>	<i>Crocus sativus.</i>
<i>Scabiosa succisa.</i>	<i>Poa annua.</i>

Of these *Matthiola sinuata* and *Gentiana cruciata* are probably blunders. In addition to these 53 species, I find about 20 other Essex records in Gerard's original work, including:—

<i>Lepidium latifolium</i> L.	<i>Prunella vulgaris</i> L.
<i>Coronopus procumbens</i> Gilib.	<i>Atriplex laciniata</i> L.
<i>Thlaspi arvense</i> , L.	<i>Gyrostachis autumnalis</i> Dum.
[<i>Lunaria biennis.</i>]	<i>Scilla festalis</i> Salisb.
<i>Sherardia arvensis</i> L.	<i>Scolopendrium vulgare</i> Symons.
<i>Pulicaria dysenterica</i> Gaertn.	<i>Asplenium marinum</i> L.
<i>P. vulgaris</i> Gaertn.	
<i>Digitalis purpurea</i> L.	

¹⁷ Gerard's Herbal "emaculatus," p. 275.

There is also an elm, probably *Ulmus montana* Stokes, what is probably *Angelica sylvestris* L., two or three species of Flax, and "five kinds of Cuckowe flowers or Ladie smockes."

About 17 of Gerard's Essex records seem to be the first British notices of the species, viz. :—

<i>Mathiola sinuata</i> R.Br.	<i>Populus alba</i> L.
<i>Atheca officinalis</i> L.	<i>Cephalanthera ensifolia</i> Rich.
<i>Melilotus officinalis</i> Lam.	<i>C. pallens</i> Rich.
<i>Potentilla palustris</i> Scop.	<i>Asparagus officinalis</i> L.
<i>Rosa spinosissima</i> L.	<i>Convallaria majalis</i> L.
<i>Diotis candidissima</i> Desf.	<i>Poa annua</i> L.
<i>Statice limonium</i> L.	<i>Asplenium marinum</i> L.
<i>Cynoglossom germanicum</i> Jacq.	<i>A. ruta-muraria</i> L.
<i>Atriplex laciniata</i> L.	

Nearly all the species are illustrated by figures, some quite indistinguishable, others wrongly assigned, but some remarkably good. As Gerard's *Herball* is now a rare work, and a good deal of interest attaches to these early records and the identification of the species intended, I propose transcribing all the passages referring to Essex plants, adding modern names and a few notes. They run as follows:—

p. 4. "Gramen minimum album. The white Dwarfe grasse . . . doth grow very plentifully among the hop gardens in Essex." [*Poa annua* L.]

Hops are still much grown in the Colne valley, and *Poa annua* is still a common weed.

p. 100. "Hyacinthus albus Anglicus White English Hare-bels or Iacint and . . . another sort which hath flowers of a faire carnation colour . . . grow in the woods by Colchester in Essex." [*Scilla festalis* Salisb.]

p. 124. "Common, or the best knowne Saffron groweth plentifully in Cambridgeshire, Saffron Walden and other places thereabout, as corne in the fieldes." [*Crocus sativus* L.]

p. 168. "Orchis Frisia & Orchis Leodinensis, Friezland Ladie traces and Liege Ladie traces . . . The yellow kinds growe in barren pastures and borders of fields about Ouenden and Clare in Essex. Likewise neere unto Muche Dunmowe in Essex, where they were shewed me by a learned gentleman master James Twaights, excellently well seene in the knowledge of plants." [*Gyrostachis autumnalis* Dum.]

p. 187. "Dittander is planted in gardens, and is to be found wild also in England in sundrie places, as at Clare by Ouenden in Essex." [*Lepidium latifolium* L.]

p. 198. "Erysimum sylvestre, Wilde bancke Cresses, with leaves like Dandelion, . . . I found it growing at a place by Chelmesforde in Essex called little Baddowe."

This would be *Sisymbrium polyceratium* L., but Johnson says:—¹⁸

"If our Author meant this which I have described and given you the the figure of (as it is probable he did), I doubt he scarce found it wilde."

p. 249. "Brassica marina Anglica. . . The sea Colewoort groweth naturally vpon the bayche and brims of the sea, where there is no earth to bee seene, but sand and rowling pibble stones, which those that dwell neere the sea doe call Bayche : I found it growing . . . in many places neare Colchester." [*Crambe maritima* L.]

p. 257. "*Atriplex marina* . . . certaine Orache . . . I have found in our owne country, neere the sea side . . . it groweth by the blockhouse of Tilberie." [*Atriplex laciniata* L.]

Johnson (p. 325) suppresses this locality, without comment.

p. 278. "Thorne apples . . . The iuyce of Thorne apples boiled with hogges grease to the forme of an vnguent or salve, cureth all inflammations whatsoever, all manner of burnings or scaldings, as well of fire, water, boyling leade, gun-powder, as that which comes by lightning, and that in very short time, as my self have found by my dayly practise, to my great credit and profit. The first experience came from Colchester where Mistresse *Lobel* a Merchants wife there being most grievously burned with lightning, and not finding ease or cure in any other thing, by this found helpe when all hope was past, by the report of Mr. *William Ramme*, publique Notarie of the said towne, was perfectly cured. [*Datura stramonium* L.]

p. 295. "The yellowe horned Poppie. Papauer cornutum flore luteo . . groweth vpon the sandes and bankes of the sea: I found it growing . . . at Lee at Essex : at Harwich." [*Glaucium flavum* Crantz.]

p. 324. "*Cochlearia Britannica*. Common English Scurvie-grasse . . groweth in diuers places vpon the brims of the famous riuer Thames, as at Woolwich, Erith, Greenhithe, Grauesend; as well as on the Essex shore.' [*Cochlearia anglica* L.]

p. 326. "*Ophris Bifolia*. Twaiblade . . groweth in moist medowes, fennie grounds and shadowie places. I haue found it in many places, as . . in the woods by Quenden neere to Clare in Essex, and in the woods by Dunmow in Essex." [*Listera ovata* R. Br.]

p. 327. "*Ophioglosson*. Adder's toonge . . groweth in moist medowes throughout most parts of Englande, as . . in the fieldes in Waltham forrest." [*Ophioglossum vulgatum* L.]

p. 328. "*Herba Paris*. One Berrie, or herbe Truelove . . . groweth plentifully in all these places following, that is to saie, in Chalkney woode neere to wakes Coulne, seauen miles from Colchester in Essex; . . . in the parsonage orcharde at Radwinter in Essex, neare to Saffron Walden; . . . in Bocking parke by Braintree in Essex." [*Paris quadrifolia* L.]

p. 329. "*Lunaria minor*. Small moonewoort . . . groweth also in the ruines of an olde brickekill by Colchester, in the grounde of master *George Sayes*, called Miles ende." [*Botrychium lunaria* Sw.]

p. 332. "*Lilium conuallium*. Conuall Lillies . . . or Lillie of the Vally . . . groweth . . . neere to Lee in Essex." [*Convallaria majalis* L.]

p. 333. "*Limonium*. Sea Lauander spike . . . groweth . . . in the salt marshes by Lee in Essex: in the Marsh by Harwich, and many other places." [*Statice limonium* L.]

Gibson remarks ("Flora," p. 253) that "Gerard's figure seems quite as like *S. bahusiensis*," i.e. *S. variflora* Drejer.

p. 333. "*Triptolium vulgare*. Sea Starwort . . . There is another kinde of *Triptolium* like the first, but much smaller, wherein consisteth the difference. . . . The-e herbs grow plentifully along the English coastes in many places, as . . . in a marsh which is vnder the towne wals of Harwich, in the marsh by Lee in Essex." [*Aster triptolium* L.]

p. 337. 1. *Sagittaria major*. Great Arrowe head. 2. *Sagittaria minor*. Small Arrowe head. 3. *Sagittaria minor angustifolia*. Narrow-leaved Arrow head. . . . These herbes do grow in the watrie ditches . . . by Chelmsford in Essex. [*Sagittaria sagittifolia* L.]

Gerard's three names refer only to variations which commonly occur in the arrow-shaped leaves of this species, without reference to the grass-like submerged leaves and the ovate unbarbed floating ones that also occur.

p. 343. "*Plantago maritima*. Sea Plantaine . . . doth growe neere vnto the sea side in all the places about Englande where I have trauelled, especially by the fortes on both sides of the water at Grauesend; . . . at Lee in Essex." [*Plantago maritima* L.]

p. 346. "*Cauda Muris*. Monsetaile . . . groweth . . . in Woodford Row in Waltham Forrest, and in the orchard belonging to Master *Francis Whetstone* in Essex." [*Myosurus minimus* L.]

p. 346. "1. *Cornu Ceruinum*. Hartes borne. 2. *Coronopus Ruellij*. Swines Cresses, or Buckshorne . . . growe . . . at Waltham, twelve miles from London." [*Plantago coronopus* L. and *Coronopus procumbens* Gilib.]

p. 347. "Saracens Consound. *Solidago Saracenicca* . . . groweth by a wood, as yee ride from great Dunmowe in Essex, into a place called Clare in the saide cuntry; from whence I brought some plants into my garden."

This should refer to *Senecio saracenicus* L.; but under *Arabis*

quorundam of Camerarius, which would seem, as Mr. Jackson points out,¹⁹ to be *Sisymbrium strictissimum* L., Johnson says:—²⁰

“Without doubt this is the very plant that our Author mistooke for *Solidago Sarracenia*, for he bewraies himselfe in the chapter of *Epimedium* whereas he saith it has cods like Sarracens Consound; when as both he, and all other giue no cods at all to Sarracens Consound. My very good friend Mr. John Goodyer was the first, I thinke, that obserued this mistake in our Author.”

At the same time *Sisymbrium strictissimum* is neither British, nor very likely to have occurred at Dunmow.

p. 349. “*Virga aurea*. Golden Rod” and “*Virga aurea Arnoldi Villanouani*. Arnold of the new towne his Golden Rod. . . They both growe plentifully . . . in a wood by Rayleigh in Essex.” [*Solidago virgaurea* L.]

On the second of these forms Messrs. Trimen and Dyer write:—²¹

“A dwarf form was distinguished by the old botanists. Gerarde calls it *V.-a. Arnoldi Villa novani*, and both he and Johnson mention it in Hampstead Wood. It is probably *V.-a. vulgari humilior* (R. Syn. iii. 176) on Hampstead Heath; Huds. i. 319; and nearly answers to Smith's *var Cambrica*.”

p. 352. “*Gentiana minor Cruciata* . . . Crossewoort Gentian groweth in a pasture at the west ende of little Rayne in Essex, on the north side of the waie leading fram Braintrie to much Dunmow; and in the horse way by the same close.” [*Gentiana cruciata* L.]

This error, as it almost certainly is [Gibson p. 205] may have arisen by a slip for *Blackstonia*, *Erythræa* or *Galium cruciata* Scop.

p. 358. “*Helleborine*. Wilde white Hellebor . . . groweth . . . in the woods of Dunmowe in Essex: . . . in a little groue of Juniper, and in a woode by Clare in Essex.” [*Cephalanthera fallens* Rich.]

p. 365. “*Trachlium minus*. Small Canterburie bels . . . groweth . . . in Hennyngham parke in Essex.” [*Campanula glomerata* L.]

p. 376. “Of Sea stocke Gilloflowers.” “These plants do growe neere vnto the Sea side, about Colchester.”

Gerard enumerates no less than five kinds. Johnson (*op. cit* p. 461) doubts whether any except perhaps *Leucoium marimum purpureum* L'Obelij have been found wild. Gibson in the “Additions and Corrections” to his *Flora*, p. 456, rightly identifies this one species with *Mathiola sinuata* R.Br., at the same time pointing out that it “is probably a mistake” to have recorded it for Essex.

¹⁹ *Catalogue of plants . . . in the garden of John Gerard*, p. 51.

²⁰ Gerard *emac.* p. 275

²¹ *Flora of Middlesex*, p. 150.

p. 377. "*Viola Lunaria* sive *Bolbonac*. White Sattin . . hath beene founde wilde . . in Essex . . about Hornchurch." [*Lunaria biennis*.]

p. 401. "*Tithymalus faralius*. Sea Spurge . . groweth by the sea side vpon the rowling sande and baich, as at Lee in Essex, at Langtree point right against Harwich." [*Euphorbia faralias* L.]

p. 455. "*Clymenon Italarum*. Tutsan or Parke leaues . . groweth . . in a wood by Railie in Essex." [*Hypericum androsæmum* L.]

p. 447. "Of Wilde Flaxe . . The third and fourth growe vpon rocks and cliffes neere to the sea side. I haue seene them growe vpon the sea bankes by Lee in Essex." [*Linum angustifolium* Huds. and, probably, *L. catharticum* L.]

[*To be continued.*]

REPORT OF THE CLUB'S DELEGATE AT
THE MEETING OF THE CORRESPONDING
SOCIETIES' COMMITTEE OF THE BRITISH
ASSOCIATION AT DOVER, SEPTEMBER,
1899.

THE meetings of the Conference were held in the Mayor's Parlour at the Town Hall, Dover, on Sept. 14th and 19th, at 3 p.m. A brief report, which was taken as read, was in the hands of every delegate on the 14th. In it the Corresponding Societies' Committee of the British Association expressed their pleasure at being able to state that the resolution passed at the Bristol Conference of Delegates last year, on the desirability of securing the co-operation of the Coast Guard, in making systematic observations on Coast Erosion, had been adopted by the Council of the Association, and favourably received by the Admiralty. Forms, drawn up by a Committee of the Council of the Association, which had been appointed to consider the subject, have been issued by the Admiralty, and many have already been returned, filled in by the Coast Guard. Of course the object of these forms is to promote uniformity in the nature of the observations made, and to direct attention to those points which most need to be noted. As it is in the highest degree desirable that observers belonging to the local scientific societies should know what kind of information is most required—the services of the Coast Guard being designed to supplement, not to supersede, their own—copies of Forms I. and II. are here given :—

FORM No. I.]

OBSERVATIONS OF COAST CHANGES.

[*To be filled in and returned as soon as convenient.*]

Instructions to Observers in regard to Changes that are taking place along the Coast-line of the British Isles.

1. Mention the part of the coast on which you report, and give its limits.
2. State whether the coast is cliffy or low; whether rocky, sandy, gravelly, or muddy. If it is cliffy, give the average height of the cliffs, and, if possible, the nature of the material of which they consist, especially whether hard rock, chalk, clay, &c. State also the nature of the beach.
3. What is the vertical range of ordinary spring-tides?
4. Is the sea encroaching on the coast? If so, state briefly the proofs of this change.
5. Is the land gaining on the sea? If so, give shortly the evidence of such advance.
6. Are there any artificial causes which tend to increase or retard the natural changes on the coast? For instance, are there any groynes along the shore, and if so, what effect have they on the travelling shingle or sand? Are the shingle, sand, or slabs of stone, removed for industrial or other purposes?

_____. *Signature of person Reporting.*

_____. *Coast Guard Station.*

FORM No. II.

OBSERVATIONS OF COAST CHANGES.

[*To be retained until there are some actual changes to be reported, after which the form should be filled up and returned without delay, in order that if needful a more careful survey of the changes reported on may be made by the Committee of the British Association.*]

Instructions to Observers in regard to Changes that may take place along the Coast-line of the British Isles.

- A. When changes are actually observed to be taking place on the coast, either as to advance or retreat of the sea, it is very desirable that information

regarding them should be forwarded as soon as possible. For example, when any fall of a portion of shore-cliff occurs, note of the circumstances should be taken, with measurements (if that be found practicable) or estimates of the area or amount of material that has been dislodged. When any groynes or other artificial protections of the coast are washed away, this should also be reported, and likewise when any new groynes or other works on the coast are constructed.

B. The Council of the British Association will be glad to receive any other information of which the observer may be in possession, bearing upon the changes that are taking place along the shore.

[The answers to these two paragraphs A and B can be written below, or if necessary on other sheets of foolscap paper.]

_____ *Signature of person Reporting.*

_____ *Coast Guard Station.*

At the first meeting of the Conference, the Rev. T. R. R. Stebbing, F.R.S., Chairman of the Conference, after a few preliminary remarks on the result of the discussion on Coast Erosion at the Bristol meeting, read a short paper on

THE LIVING SUBTERRANEAN FAUNA OF GREAT BRITAIN AND IRELAND.

In the first place he noticed the many animals which, though their dwellings are in some sense subterranean, yet come out and roam over the surface for various purposes either by night or by day. As examples he mentioned bats and rats, foxes, rabbits, badgers, moles, vipers, lizards, beetles, and worms, together with various marine species, which have a habit of burying themselves in sand and ooze. From these he turned to creatures which pass the whole of their lives underground in wells and caverns. The first undoubted mention of a subterranean animal of this kind seemed to be that of a crustacean belonging to the Amphipoda, found in London, and named by Dr. Leach, of the British Museum, in 1813. Since that time many valuable treatises on creatures of subterranean life had been published in various European languages, including the Polish. The English student should study "The Cave Fauna of North America," by Dr. Packard, published in the *Memoirs of the National Academy of Sciences*, Vol. iv., Washington, 1888; also "The Subterranean Crustacea of New Zealand," by Dr. Charles Chilton, published in the *Transactions of the Linnean Society of London*, 1894. Packard enumerated 308 European cave animals, and 102 American. This total of 410 includes a few Protozoa, a Sponge, two Hydrazes, a few Worms, one Mollusc, several Crustacea and Myriapods, numerous Arachnids and many Coleoptera. The other insects were chiefly Thysanura. The Vertebrates consist of four American Fish and one European Batrachian, the celebrated *Proteus anguineus*. The known well-fauna of Great Britain and Ireland comprise only four species of

Amphipoda, and these De Rougemont would reduce to a single species.¹ Two other forms, however, have been found in recesses of coalpits in Scotland and Northern England. Mr. Stebbing noticed the blindness and want of colour characteristic of this subterranean fauna; also the singular fact that while its study may be said to have begun in England, almost every discovery therein during the last 50 years had been made in the wells and caverns of other countries, whether European or American. He concluded by remarking that it would indeed be extraordinary should Great Britain and Ireland not yield on investigation a fauna comparable to that found in other parts of the world. In this research he hoped that some members of our local scientific societies might take a share.

In answer to a question as to the best way of catching "Well-shrimps." Mr. Stebbing replied that a good plan was to wait till the well was nearly empty, then let down a bucket and withdraw it as soon as possible. Sometimes they were brought up when pumping was going on.

Some discussion then ensued, in which Rev. J. O. Bevan, Mr. T. Workman, and Mr. Hotblack took part, as to whether the Bats in the Mammoth Cave of Kentucky passed all their time there. It was hardly a matter that could be decisively settled, but some presumption that they did not was afforded by a remark of Mr. Workman's (who had visited the Mammoth Cave) that they were not found in the depths of the Cave, though in great numbers near the mouth.

Mr. Hotblack said that a Well-shrimp had been obtained at Norwich by a member of the Society he represented (Norfolk and Norwich Naturalists' Society).² Mr. Mark Stirrup mentioned that a few years ago a Society was started in Yorkshire for cavern exploration, with which a search for underground fauna might well be combined. Mr. Stebbing had certainly opened out for them a new field of research.

The Chairman (Mr. Stebbing) added that two gentlemen had written to him on this subject, Mr. E. S. Goodrich, of the Department of Comparative Anatomy, Oxford, who would be glad to have any specimens of blind Crustacea from wells and caves for experimental purposes, and Dr. Charles Chilton (to whose work on the underground fauna of New Zealand he had already referred) who was living in Edinburgh. Dr. Chilton was collecting information about the English Well-Amphipoda, and would be glad of specimens. A general hope was expressed

¹ In a letter to the Editor, Mr. Stebbing says that the British Well-shrimps are *Niphargus aquilex*, Schiödte, *N. fontanus*, Spence Bate, *N. Kochinas*, S. Bate, and *Kraangonyx subterraneus*, S. B. He adds, "of these the first is most frequently met with in England."

² This species is *Niphargus aquilex*, see "Notes" in the present part of the E.N.—E.I.

that Mr. Stebbing's paper would be printed in full, and the meeting came to an end.

It occurs to me here to remark that it is highly desirable that an account of the finding of a Well-shrimp, or other wholly subterranean creature, should give not only the depth of the well, but also the nature of the rocks through which it is sunk. Of course, in the case of a well sunk in sand or gravel, no subterranean animal could be expected, unless it were so minute that not only the ova but the adult animal could pass through the mass as the percolating water does. But it would be interesting to be able to note the proportion of subterranean creatures, if any, in sandstones as compared with limestones. In both kinds of rock water circulates mainly along lines of jointing or lines of fault, but in limestones the dissolution of the rock here and there, by the action of the water percolating through it, gives rise to hollows and caverns varying in size from spaces only large enough to accommodate a few Well-shrimps to the Mammoth Cave of Kentucky. In sandstones, on the other hand, hollows arising from the dissolution of the rock do not occur, but it seems possible that here and there in a sandstone, along lines of jointing or of fault, the erosive action of water carrying particles of sand in suspension might at length give rise to spaces capable, as regards size, of being the residence of Well-shrimps, though nothing comparable to limestone caverns would be produced. Therefore, while subterranean animals may naturally be expected to exist mainly, if not wholly, in limestones, it seems quite within the limits of possibility that certain forms of life, probably differing from those common in limestone, may some day be found in sandstone wells. Wells, however, in Essex, Suffolk and Norfolk are almost certain to be either in that well-known limestone, the Chalk, or in superficial sand and gravel.

At the SECOND MEETING of the Conference on September 19th, the proceedings began with a long and desultory debate as to the best ways of making the meetings of the Conference more useful. While it was proceeding Rev. T. R. R. Stebbing had to leave, and Professor W. W. Watts became Chairman. At length it was decided that it would be best for individual delegates to write to the Corresponding Societies' Committee, suggesting improvements, not later than the end of the first week in November. Letters received by that date would then be considered by the Committee, when they met later in that

month. Then Mr. Hugh Blakiston, Secretary of "The National Trust for Places of Historic Interest or Natural Beauty," gave a brief account of the aims and modes of action of that Institution.

The National Trust, said Mr. Blakiston, was founded in the year 1804 by the Duke of Westminster, the Earl of Carlisle, Lord Hobhouse, the Right Hon. James Bryce, Sir Robert Hunter, Miss Octavia Hill, and others, and incorporated as a limited liability company for purposes which are shortly set forth in the Memorandum of Association:—

"To promote the permanent preservation, for the benefit of the nation, "of lands and tenements (including buildings) of beauty or historic interest; "and as regards lands, to preserve (so far as practicable) their natural aspect, "features, and animal and plant life; and for this purpose to accept, from "private owners of property, gifts of places of interest or beauty, and to hold "the lands, houses, and other property thus acquired, in trust for the use and "enjoyment of the nation."

No lands or tenements of beauty or historic interest, given or bequeathed to or acquired by the Trust for the benefit of the Nation, shall, at any time, whether upon the winding up or dissolution of the Trust, or otherwise, be sold or otherwise dealt with in a manner inconsistent with the objects of the Trust; thus the Association affords ample security for the permanent safe custody of all property committed to its care.

Mr. Blakiston went on to remark that Great Britain is singularly rich in historic buildings, and is singularly indifferent to their preservation. In Austria, France, and Italy, it is considered one of the functions of a Minister of State to look after these national treasures. As regards the objects of the National Trust, the Queen's reign has been a peculiarly disastrous period on account of the growth of large cities, which has been necessarily unfavourable to the preservation of ancient buildings. Though a certain amount of destruction has been unavoidable, yet much might doubtless have been averted. Putting aside monuments of prehistoric times, there were still, buildings illustrating every stage of our history from the Roman Occupation to the present day. But the increase of population, and its tendency to congregate in large towns, are rapidly causing the more ancient central part of a town to become a wilderness of shops, offices, and eating-houses, the people frequenting these establishments by day sleeping in monotonous streets in the suburbs, where the children see around them nothing to suggest to the mind anything outside the dull round of every day life. It was most important that everything calculated to stimulate the imagination to realise our past history or to develop a feeling for natural beauty should be preserved, if possible. Then, millions of people living far from our shores look upon these Isles as their Old Home, and feel justly that our historical monuments and beautiful scenery should be preserved in a manner worthy of our great history. As examples of what the Trust has already done the following instances may be selected:—

It has, by purchase, obtained Barras Headland, opposite Tintagel Castle, and will preserve it unbuilt upon, with all its gorse and thrift and close cropped turf, to delight the dreamers of old Arthurian times, or the landscape painter of to-day.

Again, it holds, by gift, the most beautiful bit of cliff that overlooks Barmouth, its estuary and seashore, with the distinct understanding that no other walks than those at present in existence shall be made; that it shall be grazed, as heretofore, by sheep; and that no harm shall be done to the gorse that grows upon it.

The gift of land on Toys' Hill, near Oxted, Kent, has secured to the lover of English scenery one of those views of green foreground and distant background of blue hills, so characteristic of the country. Another and a larger property, at Ide Hill, in the same district, will soon be acquired.

It has, also, cast upon it the burden of raising funds to put into tenantable repair an early XIVth century clergyhouse, at Alfriston, in Sussex, and here, again, it has done all that loving care and wise direction could suggest to retain in its ancient condition the construction, the timbering, and the household arrangements, in order that men of the XIXth and XXth centuries may realise how men of the XIVth had their habitation.

It has lately, at the will of the Trustees, taken under its care the Falkland Monument, upon the Newbury Battle Field.

Nor have the claims of science escaped recognition. By the purchase of land in Wicken Fen, Cambridgeshire, a portion of the primeval fen land of East Anglia, with its plant and insect life, will remain undrained and unmolested for ever.

The National Trust is not only a holder of natural scenery and ancient buildings, but it also does what it can to promote local interest in the preservation of any worthy historical object or of natural beauty.

Whether it be a waterfall destroyed as in the case of Foyers, or an old bit of Sir Christopher Wren's London, the Trinity Almshouses, Whitechapel, that is threatened, or the quietude of Kynance Cove and the destruction of the rocks of the Cornish foreshore, near the Lizard, or the alteration of the line of the shore at Chelsea that is brought under its notice, or the need of obtaining such a pleasure ground as Churchyard Bottom Wood for the people, the Trust, working sometimes alone, at other times in conjunction with kindred societies, brings its influence to bear in the direction and spirit of its promoters.

It may be useful to add that a minimum subscription of 10s. includes membership and copies of the report, and entitles to a voice in the annual election of members of the Council and Officers of the Trust.

Mr. Blakiston concluded by remarking that it was proposed to form a Federation of Archaeological and Naturalist Societies throughout the country, with the view of accomplishing what could not be achieved either by a Central Society acting by itself or by local Societies acting by themselves. The proposed scheme for federation would probably be issued by the National Trust during next month.

The work of the National Trust was generally approved by the delegates present. Mr. Gray gave some account of the unsuccessful attempt at Belfast to prevent a Syndicate from enclosing the Grant's Causeway, and Mr. Vaughan Cornish inquired to what extent the aims and objects of the National Trust were those of other Societies? Mr. Blakiston replied

that there was another Society for the protection of ancient buildings, but it had no power to hold buildings as the National Trust could. The National Trust was in close touch with that Society, also with the Selborne, the Commons Preservation, and other Societies. He did not think that there was any danger of overlapping as regards the work of these Societies. A vote of thanks to Mr. Blakiston was then heartily accorded, on the proposition of the Chairman.

SECTION A.

Mr. G. J. Symons said that the Committee for Seismological Observations was badly in want of a home, and would be glad if some ancient building could be allotted to them.

SECTION C.

The Chairman mentioned two investigations in which the local Societies had been of much assistance. The Committee to investigate the Erratic Blocks of the British Isles presented a report this year. The Committee for the Collection, Preservation and Systematic Registration of Photographs of Geological Interest, of which he was Secretary, would be glad to receive any contributions of such photographs. They hoped to be able to undertake the publication of typical geological photographs in such a way as to render them easily obtainable by those who could make good use of them. It would greatly help the Committee if local societies would agree to purchase a series of these photographs. There was a duplicate collection of prints and lantern slides which could be sent to any local society wishing to exhibit them and to see what kind of work was being done, the only expense incurred by the local society being that of carriage. They proposed, when publishing the photographs to add letterpress descriptions.

It may be remembered that the duplicate series mentioned by Professor Watts were shown to the Essex Field Club last winter. Those who were present will remember their excellence.

SECTION D.

The Rev. T. R. Stebbing said that the Secretary of that Section recommended the study of the fauna of wells and caverns by the Corresponding Societies.

SECTION K.

Mr. H. Wager informed the delegates of the Corresponding Societies that the Section had appointed a Committee to consider the Geographical Distribution of Mosses, a subject of interest to all the Corresponding Societies.

Mr. Vaughan Cornish congratulated the Corresponding Societies on the result of the discussion on Coast Erosion, at Bristol, last year, initiated by Mr. Whitaker. Seldom, if ever, had the Admiralty acted so promptly before. The meeting then came to an end.

T. V. HOLMES, *Sec. Cor. Soc. Committee,*
Delegate, Essex Field Club.

NOTE ON THE OCCURRENCE OF THE
WHITE-TAILED EAGLE (*HALIÆTUS*
ALBICILLA) AND THE SALMON (*SALMO*
SALAR) AT HARWICH IN 1666.

By MILLER CHRISTY, F.L.S.

WHILST examining recently some documents among the State Papers (Domestic Series) belonging to the reign of Charles II., preserved at the Public Record Office, I came by accident across one letter containing a very quaintly-expressed and curious item relating to the avi-fauna of the County of Essex. The letter was written from Harwich on the 20th of October 1666 by one Francis Newby, a servant of the Navy Commissioners at Harwich. It runs as follows:—

HARW^{ch}, OCTOB^r 20th, 1666.

My deere friend,

I haue writt three seuerall Letters to you, of w^{ch} I haue had noe Answer of the Rec^t of any of them, w^{ch} makes me Doute of your non [?] helthe.

for Newes, I haue Not any, onely yesterday heere lighted vpon the Rope house one the Greene² a Mighty Greate Eagell. from whence she Cam is Not knowne. she was kild by one of the Carpenters belonging to his Mat^s yard heere. her wings are 7 foote od inches long, one of her Clawse being vpwards of nine inches long. 'tis iuagined y^t she Cam from beyond the Sease,

¹ *State Papers, Domestic, Charles II., vol. 175, no. 120.*

² "The Store-Houses to the Rope Walke" are shown on the Green in the general view of Harwich given in the beginning of Dale's *History and Antiquities of Harwich and Dovercourt* (London, 4^o, 1730).

from sum far Cuntry, and was Extreame weary, hauing one shot made at her, and budged not; but, at the second shott she was killed.

Mr. Readman acquainted me y^t hee deliuer[ed] y^e small token J sent you, w^{ch} was a dryed Salmon; w^{ch} he pleased to accept as a poore mite of y^e affection of

Yo^r Reall Freind and humble Seru^t,
FFRA. NEWBY.

[P.S.]—The shippes that are Now in harbour to be Refitted out wth Speede are the Coulchester, Speedwell, Vicktory, Richmond, Garland, Reserue, Aduenture, and Delfe.

The matter did not end here. Joseph Williamson, Secretary to the Navy Commissioners, hearing, from the official to whom this letter was addressed, of the occurrence of the Eagle, wrote to Mr. Silas Taylor, Keeper of the King's Stores at Harwich,³ and one of Newby's superiors, asking for further information about the bird. Taylor's reply⁴ here follows:—

HARWICH, Oct. 25, 1666.

S^r,

This morning the Truelove, from convoying the Amunition to Scilly &c., return'd backe hither, haueing first conuoy'd the Shippes imployed in that seruice safe backe. Her consort, the Roebuck, is gone for Ireland.

At the end of your last written Intelligence, I read the Story of our Eagle kil'd here. I saw the Skinne of it, but did not looke upon it as soe strange a thing as others did; for why should not an Eagle fly hither as well as to Scotland? Others thinke that the Eagle may come Southerly, as beeing weather-wise and [that its coming] prognosticates a hard winter; and severall thoughts severall men haue. I haue nothing to say to it: Onely an Eagle was kild here; and I sent you noe notice of it because I thought it not worth y^e writing about; and, your intelligence giving me notice of it, I thought it may bee a freindly reproofe.

Our Shippe are here still [that] I formerly wrote you off; and we haue noe newes; Onely I am, S^r,

Your most humble serv^t,
SILAS TAYLOR.

To Joseph Williamson, Esquire.

³ This Silas Taylor (*alias* Domville) was the man who collected the matter relating to the history of Harwich which Dale afterwards added to and published in 1730. Dale speaks of him in his preface as "a lover of Antiquities, a person of leisure, and a member of the Corporation," but adds that, "dying in debt, all his MSS. and papers were, together with his goods, seized on by his creditors and so dispersed."

⁴ *State Papers, Domestic*, Chas. II., vol. 176. no. 28.

In all probability, the bird in question was a White-tailed Eagle, specimens of which (generally immature) are not uncommon, even now, in Essex in the winter time⁵; while it is quite likely that the Salmon mentioned by Newby was caught in the River Stour, though, as it was dried, it may have come from elsewhere. It will be seen on reference to Dr. Laver's *Mammals, Reptiles, and Fishes of Essex* (p. 103) that the Salmon was formerly a regular inhabitant of our principal Essex rivers and is, even now, more or less polluted as most of them are, a not infrequent visitor.

YARDLEY HILL, THE LATEST ADDITION TO EPPING FOREST.

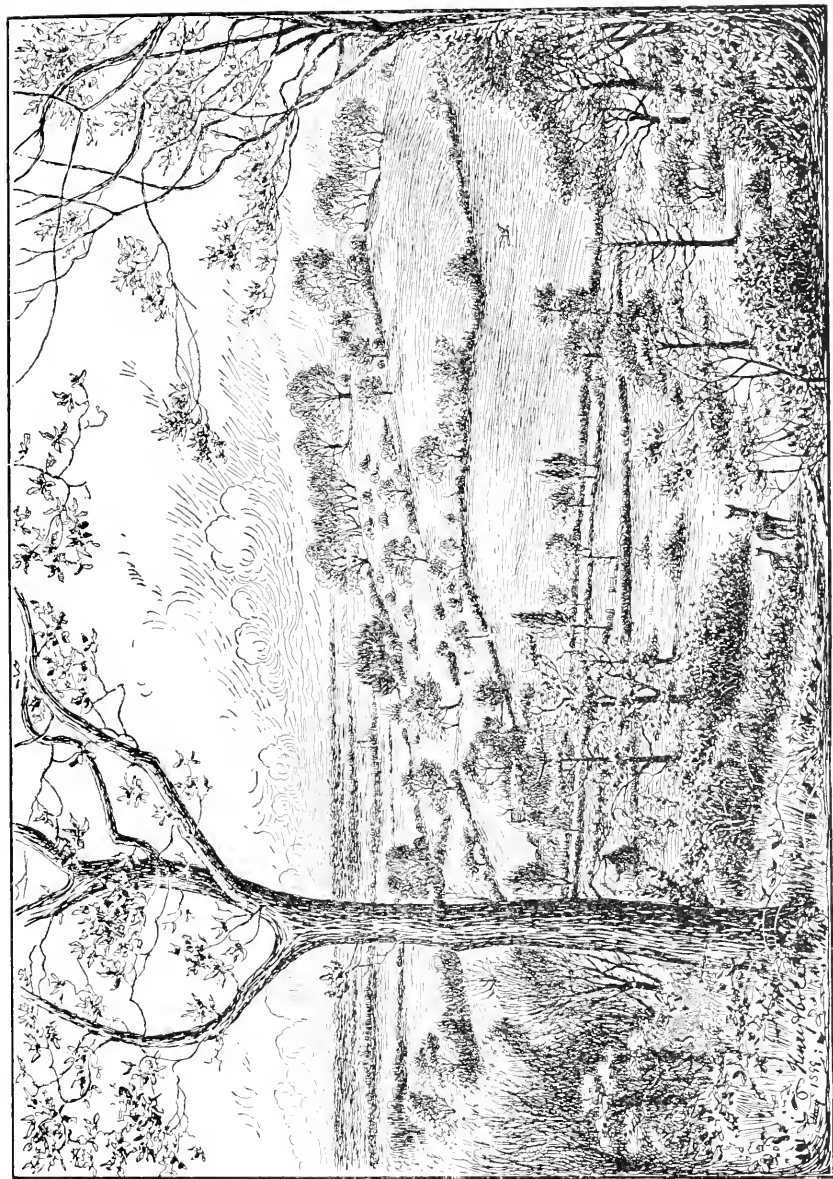
SINCE that memorable May morning seventeen years ago, when Her Majesty the Queen granted the modern "Carta de Foresta" by personally dedicating 5,500 odd acres to the use and enjoyment of the public for ever, friends of the "free forest" have recognised with gratitude and pleasure three notable additions to the woodlands. These are "Oak Hill," Theydon, "Highams Park," Walthamstow and Woodford, and the latest gift, "Yardley Hill," Chingford.

It is to the generosity of Mr. E. N. Buxton, to whom the public are indebted in large measure for the previous acquisitions, that this last splendid addition to the forest is due. At a meeting of the Common Council of the Corporation of London, on Thursday, October 20th, the following letter addressed to the Lord Mayor was read:—

"Knighton, Buckhurst Hill, October 18th, 1898.

"My dear Lord Mayor,—I have for a long time past been impressed with the importance, if not the necessity, of securing the picturesque vantage ground known as Yardley Hill as an addition to Epping Forest. It is a timbered ridge which projects into the Lea Valley basin, from which river its highest point is distant about 400 yards. From its prominent position it commands many miles of the valley, along which a manufacturing population is steadily assembling, as well as such distant points as Hampstead, Barnet, and the high grounds near Broxbourne. A more practical consideration is that it would connect that charming outlying portion of the Forest called Gillwell-lane, at present, owing to its isolation, rarely visited, with the main block near Hawkwood. My efforts, more than once renewed, have at length been successful, and I have now the pleasure of begging your Lordship, as

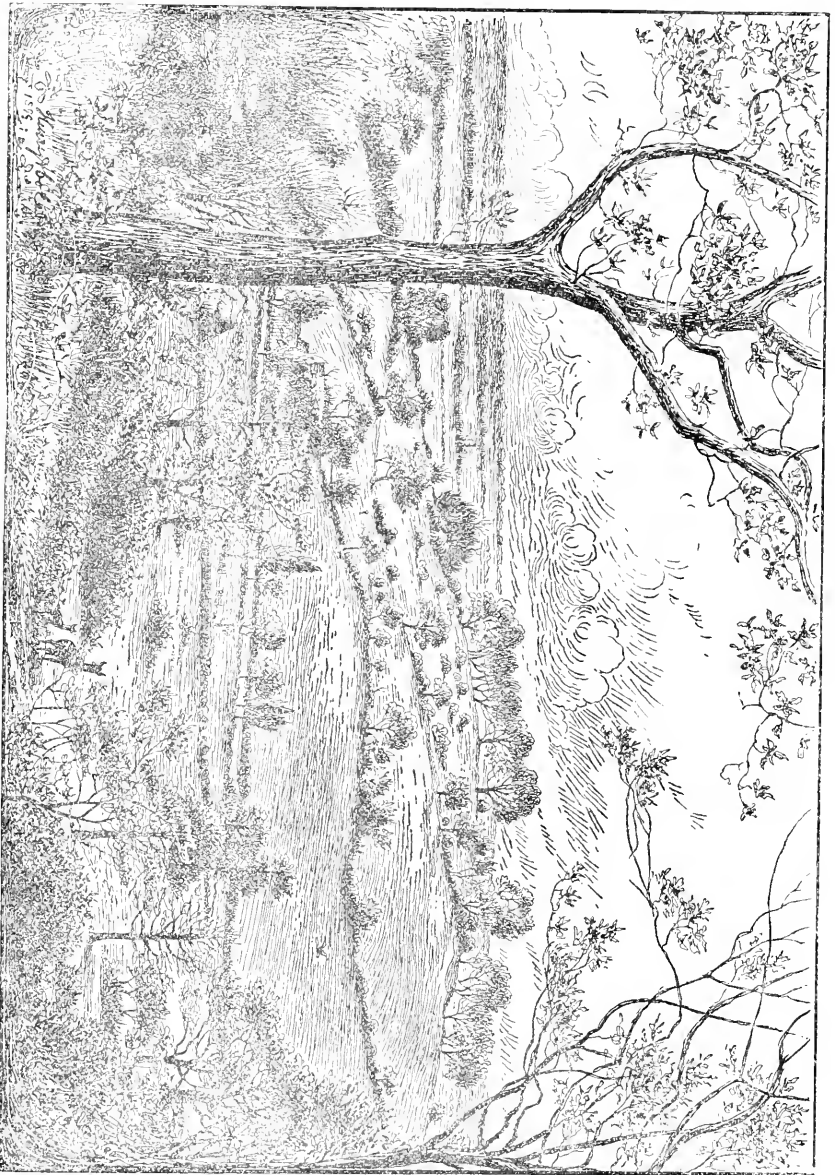
⁵ There are two specimens in the Museum of the Essex Field Club.



YARDLEY HILL, EPPING FOREST, AS SEEN FROM BURY WOOD.

Drawn by H. A. Cole, May, 1899.

W. H. & A. C. Colburn
1899



YARDLEY HILL, EPPING FOREST, as seen from Burr Wood. Drawn by H. A. Cole, May, 1890.

chief of the Conservators of Epping Forest, to accept 28 acres of this land for the public use. In making this offer, may I once more express to the Corporation, over which you preside, my abiding gratitude for their spirited action in the past, and my confident hope that, in conjunction with the residents, upon whom a duty also lies, they will lose no reasonable opportunity in the future to consolidate, extend, and complete the precious inheritance of which they are the trustees.—I am, my Lord Mayor, your obedient servant,

“ E. N. BUXTON.”

Mr. Deputy Snowden, in moving that Mr. Buxton's handsome gift should be accepted, said the offer was a most gratifying one, and it was not the first, the second, or the third time that Mr. Edward North Buxton and his family had conferred benefits upon the Corporation. (Hear, hear.) It showed also that Mr. Buxton, who knew more about the Forest than anyone else, was thoroughly satisfied with its management. (Applause.) He moved, “That this Court gratefully accepts the munificent offer of Mr. Edward North Buxton, one of the Verderers of Epping Forest, to present 28 acres of land forming a portion of the Yardley Hill Estate, Sewardstone, as an addition to the Forest, and accords him its sincere thanks for his much-valued gift, which the Court regards as a further substantial proof of the deep interest taken by him in the welfare of the Forest, and of his ever-increasing desire to add to its beauties and make them more accessible to the public whom he faithfully serves.”

Alderman Sir Reginald Hanson, in seconding the motion, said the gift was all the more gratifying as Mr. Buxton had not always seen eye to eye with the Corporation in regard to matters connected with the management of the Forest. (Hear, hear.)

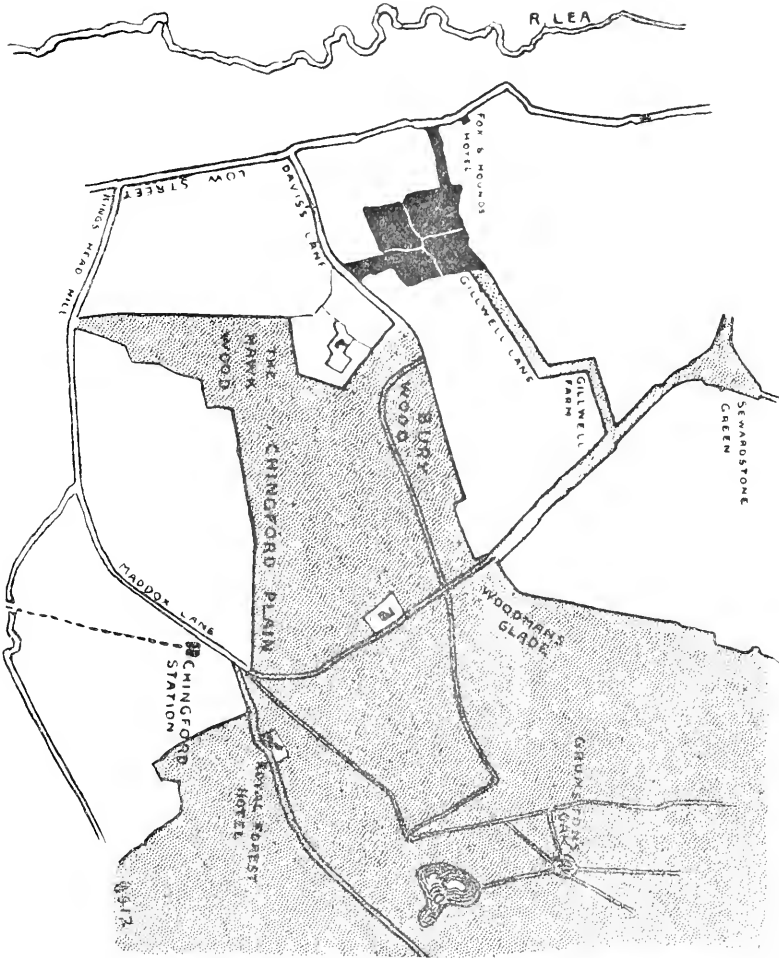
Mr. Judd remarked that it was a most unusual circumstance that a gift like the present was made to any public body accompanied by expressions which dignified it and rendered it more valuable. (Hear, hear.) The Corporation was well aware of the valuable services which Mr. Buxton and his family had rendered to the people of Greater London on the School Board and elsewhere. Mr. Buxton, instead of occupying his time for his own benefit, had chosen to devote it to the public service, and had generously spent much time, labour, and money on their behalf. (Applause.) Mr. Judd said he did not think he was out of place in calling attention to the expressions which had accompanied the gift. (Hear, hear.)

The motion was then adopted, amid loud applause.

Mr. Deputy Snowden then moved that the letter should be referred to the Epping Forest Committee, in order that the necessary steps might be taken in respect to Mr. Buxton's gift.

The motion was adopted, and it was further resolved that Mr. Buxton's letter should be printed on the minutes, and entered on the journal of the Court.

In accordance with the instructions thus given, the Epping Forest Committee, in their report presented on the 9th February, 1899, were enabled to say that possession of the land had been handed over, the hedges dividing the various fields had been



Plan showing the position of the four fields at Yardley Hill, recently added to the Forest. These are printed dead black on the plan.

demolished and obliterated, and a fence has also been erected between the land of an adjoining owner and the narrow strip which is to form the new approach to the Forest from Low Street on the Sewardstone road.

On Thursday, June 1st, 1899, a large company assembled on the crown of Yardley Hill to witness the dedication of the spot, "to be part and parcel of Epping Forest and to be open for ever to the public," the ceremony being performed by His Royal Highness the Duke of Connaught, Ranger of the Forest, who was accompanied by the Duchess. The day was summerlike and pleasant, and the fine broad landscape of the valley of the Lea seen from the hill enabled the visitors to realise vividly that a most important accession to the waste of the Forest had that afternoon become a matter of history, and warm expressions of gratitude to Mr. Buxton for his thoughtful kindness were heard on every side.

A small addition to the Forest has also been made at Leytonstone. This fact is thus alluded to in the Report of the Epping Forest Committee:—

"Harrow Green, Leytonstone, was coloured green on the deposited and final maps of Epping Forest as being part of the open waste of the Forest. A small brick-built and timber shed was erected by the turnpike road trustees on one portion of the green somewhere about the year 1847, and the arbitrator appointed by the Epping Forest Act, 1878, had no jurisdiction to deal with it. This shed and its site, which was let at £4 per annum, was recently offered for sale by public auction. The Leyton Urban District, being desirous that we should hand over the care and management to them to lay out and plant the same, suggested that the Conservators should purchase the shed and its site, and they offered to contribute one-half of the purchase-money. Having regard to the desirability of acquiring and removing the shed, which was an eyesore, if not an actual nuisance, we made arrangements through Mr. Solicitor for its acquisition. The sale took place on 27th October last, when the property realised the sum of £130. A conveyance has been made to the Conservators, and the District Council have contributed the sum of £65 towards the purchase-money. Notice has been given to the tenant to quit the property on the 25th of March next, when the shed will be removed and its site thrown into the Forest."

It may be interesting to note the quantity of land in the Official Forest. The original award of Lord Hobhouse, made on July 4th, 1882, estimated the area as 5,530 acres, 3 roods, 17 perches; Oak Hill is 12 acres 2 roods; Higham Park, 30 acres 2 roods 39 perches; Yardley Hill, 28 acres. From this total must be subtracted the four acres taken compulsorily in

1885 by the Woodford Local Board (*Jour. Proc. E.F.C.* iv., pp. cxxxvi—vii.); so that not counting such small additions as the plot at Harrow Green and elsewhere, 5,598a. 0r. 16p. represents the present area of the “free and open” grounds of Epping Forest.¹

[We are indebted to the *City Press* for the report of the meeting of the Common Council, and also to the courtesy of the editor for the loan of the block of the plan printed above. The view of Yardley Hill was contributed by Mr. H. A. Cole to the *Daily Graphic*, but the present block is a new one made from the original drawing, which was purchased from the *Daily Graphic* by our member, Mr. Avery, and is now reproduced by his favour.—ED.]

THE AFTER-EFFECTS OF THE HIGH-TIDE OF NOVEMBER 29th, 1897.

“REPORT ON THE INJURY TO AGRICULTURAL LAND ON
THE COAST OF ESSEX BY THE INUNDATION OF SEA
WATER ON NOVEMBER 29th, 1897” BY T. S. DYMOND,
F.I.C., F.C.S., and F. HUGHES, F.C.S. SEPTEMBER, 1898.

IN the account of the High Tide given in the *ESSEX NATURALIST* (vol. x., pp. 277--283), we alluded to the interesting observations made by our members, Mr. T. S. Dymond and Mr. F. Hughes, on the effect of the floods on the fertility of the land (l. c., pp. 282--3). These gentlemen continued the investigation in the Technical Laboratory at Chelmsford, and they have recently published a more complete and extended report on the subject.

It is unnecessary to repeat the details of the calamity already given in our pages. The authors approximately estimate the areas of agricultural land flooded in Essex as follows:

Tendring Hundred	..	..	..	5,570	acres.
Winstree Hundred	..	..	..	3,350	..
Thurstable Hundred	..	..	..	1,420	..
Dengie Hundred..	..	..	..	5,260	..
Rochford Hundred	..	..	..	10,620	..
Barstable Hundred	..	..	..	2,370	..
Chafford Hundred	..	..	..	950	..
Total . . . . .	..	..	..	23,710	..

The authors remark that in some districts the water drained off the land in a few hours, in others several days passed before

¹ For estimate of the ancient area of Epping Forest, compared with the present, see W. Cole, *Journal of Proc. E.F.C.*, vol. iv. p. ciii.

it was got rid of, while, where the sea walls were very seriously damaged, several weeks, and even months, elapsed before this could be done. So difficult did it prove to repair the breaches in the sea walls in New England and Pewit Island, and in part of the parish of Fambridge, that the attempt was abandoned, and many hundreds of acres of land have now reverted to the condition of "saltings."¹ The injurious effect of salt water on crops is variously stated by different authorities to last from five to twenty years. This inquiry was undertaken by the authors with a view to advising as to the best means of cultivating the land, and also to determine the amount of salt deposited, the time required for its removal by drainage, and its chemical and physical effects upon the soil constituents; knowledge which must be of value in the event of future inundations, an event not unlikely to happen while the sea-walls on many parts of our coast remain in their present insecure condition.

To ascertain how far the presence of Common Salt was injurious to the crops, a determination was made in samples of soil taken in January, 1898, from different localities and at different depths. Tables are given showing the per-centages. The average of the top soil was .25 per cent., or about 25 times more than the average amount in the soil from unflooded land,² and equal to about $2\frac{1}{2}$ tons per acre. In all probability, a quantity of this weight applied as a top dressing would injure most crops, but the writers state that there is evidence of a much larger per-centage of salt being present without directly affecting plant growth: but in this case it is diffused through the soil, and consequently does not concentrate its action upon the roots or stems of the plants. Wheat and turnips—the former newly sown and not yet germinated at the time of the flooding—grew on land containing .3 per cent. of salt; while mustard, turnips, mangolds, beet, cabbage, peas, creeping-bent grass, and red fescue, sown in flower pots filled with soil from two of the flooded districts, all germinated well and were apparently absolutely uninjured, even at the most critical period of growth, by the salt left in the soil. It would thus appear that, although the

¹ For details the reader is referred, not only to the original Report, but also to Mr. Percy Clark's papers on "The Encroaching Sea on the East Coast" (E. N., vol. x., pp. 297-299), and "Some Further Notes on the Effects of the Great Tide of November, 1897;" also to the note, "Disastrous Effects of the High Tide of November, 1897, at North Fambridge" (pp. 375-6), and the extracts, "Truly Derelict: a Curious Corner of Essex," printed on pp. 397-399, in the same volume.

² The authors estimate the water of the North Sea to contain 27 per cent. of common salt, and about .5 per cent. of other chlorides and sulphates. The common salt would be sufficient in quantity to produce serious injury to plants by plasmolysis of the root-hairs.

salt water was harmful to submerged crops, the salt left after the flood receded, and, especially when incorporated with the soil, was not directly injurious to subsequent crops.

The *indirect* action of the salt water was, however, very marked. The earth worms were killed off, and were seen after the inundation strewn upon the ground, and were quickly consumed by the gulls. It is only now, after nearly two years, that young worms are beginning to re-appear.

But the injury, say the authors, was more far-reaching than this. For some time after the flood, the soil was in a remarkably good condition, the reason for this being that the immediate effect of salt is to granulate gelatinous clay, in the same way that salts of lime are known to do. The condition of the soil, however, gradually altered until it became difficult to work, in dry weather hard and "cindery," and in wet the water percolated through the soil to the drains only half as rapidly as was the case on the unflooded land. In order to ascertain the chemical changes that occurred to render the flooded soil more gelatinous, samples of the flooded and unflooded soils were analysed, when it was discovered that the amount of lime, magnesia, potash, and soda was less by one-fifth in the clay from the former than in that from the latter. These effects appear to be due to the chemical action of the chlorides of the sea water upon the double silicates of the soil, which are decomposed, the silicate of alumina being left behind in a gelatinous condition. The writers conclude that one effect of the salt has been to eliminate the lime and other bases from the clay, and hence the unworkable and infertile condition of the soil.

The means by which the excess of salt might be removed formed an interesting point for investigation. In course of time it would certainly be eliminated by cropping, but evidence shows that this process is too slow and expensive to be solely depended on. Other methods must be employed, and the effectual and practicable ones appear to be thorough cultivation and drainage. By keeping the drains in proper working condition, the salt, being very soluble in water, is readily carried away by rainfall. As showing the effects of rain in a thoroughly drained soil in removing salt, the writers mention that, in an experiment made in the laboratory, it was found that $1\frac{3}{4}$ in. of rain water, when allowed to filter through 6in. of the soil from the flooded arable land at Wallasea, was more than sufficient to remove almost every trace of salt. Of course, as is pointed out, the elimination

of salt in the field is a very different matter, since during dry weather the evaporation of water from the surface causes an upward movement of salt. Consequently, a much heavier rainfall than $1\frac{3}{4}$ in. would be required to effect the desired result. But there is no better method than thorough drainage and trusting to the rainfall, and results indicate that in about two years' time the salt may be reduced to harmless proportions, if proper advantage is taken of the natural remedy. For the eighteen months from December, 1897, to May, 1899, the total rainfall was $26\frac{3}{4}$ in., and a second analysis of the soil showed that during this period the salt had been reduced in some cases to one-tenth, and on the average to one-quarter of the amount present in the beginning of 1898.

After showing the impoverishing effect which the salt has had upon the soil, attention is directed to the consideration of the crops best adapted for flooded land. Wheat, barley, oats, and mangolds have all given a fair yield in some cases, and in others have completely failed. Ryegrass, of which much was expected, has proved disappointing, in some cases even failing to germinate. The only class of crop or weed that was uniformly productive was the Cruciferous order, kale, rape, mustard, turnips, and the hated charlock, all prospering where other crops failed.

Very interesting details are given throughout the paper, derived from chemical and cultural experiments, and in their extended form, Messrs. Dymond and Hughes' researches are of considerable importance from a scientific as well as an agricultural point of view.

ON THE LOCAL EXTINCTION AND DIFFUSION OF MOLLUSCS IN ESSEX.

By J. FRENCH.

[Read December 12th, 1896.]

THE object of these remarks is to show that local observation in our districts may be rewarded by obtaining cases of diminution and increase of species of Mollusca in quite recent times, and to show how small are the factors that effect these changes.¹

¹ [Mr. French began his paper by some general observations of a more or less theoretical character, on the geological history of the Mollusca, and the agencies which may have caused their variation and distribution. These observations are omitted as being hardly suitable for our pages. The Editor has to thank Mr. T. V. Holmes, F.G.S., and Mr. W. Whitaker, F.R.S., for very kind advice and assistance in preparing the paper for the press. A few notes by Mr. Holmes are indicated by the initials T. V. H.—E.D.]

On looking over the list of the Land-Mollusca of the British Isles, we observe how large is the proportion of small, and even minute, forms. Yet other things being equal, in power of distribution by travel the larger Molluscs have a great advantage. I once kept a specimen of *Helix pomatia*, which was a habitual traveller, and once crept nearly a hundred yards in one night. Hence, the large species would have a better chance of obtaining new settlements than small ones. It is probable that the larger forms, in some cases, suffer, or have suffered, destruction chiefly on account of their conspicuousness. It is a common experience of the snail-hunter that at the outset he cannot find the minute forms, nor, if he had to depend upon his eyes and hands alone, could he make much progress, except accidentally. Yet in time he gets to learn that, in point of numbers, many of these minute species may far outnumber the larger forms with which everyone is familiar. The inference here is plain—that, given any snail-eating bird or other animal, the larger forms are those that will first succumb, whilst the smaller species will escape notice. Part of the disparity in numbers between large and small species may be due directly to their size. There are a few species that are quoted chiefly from sea-board districts that may be noticed. That they are not dependent upon a littoral vegetation or conditions is clear from the circumstance that they are sometimes found inland. Such are *Succinea oblonga*, *Helix revelata*, *H. pisana*, *H. virgata*,² and others. The reason seems to be that they meet with enemies as the country is penetrated, and rarely succeed in permanently spreading themselves inland.

It is, however, possible that the enemies of snails in England now do not very greatly affect their distribution. *Helix nemoralis* is everywhere common, and yet it is everywhere sought for by blackbirds and thrushes. In the immediate past, as instanced by the shell-marls, it was equally common, and it has therefore held its own in spite of its enemies, other causes probably operating to favour its vigorous life and wide distribution as a species. One effective cause of extinction of Molluscs is change in the character of the habitat. The variations in my neighbourhood (Felstead) are due to two causes. One is the wasting away of a calcareous soil, and the other is the increasing dryness of the soil due to drainage. We will take the cases due to calcareous waste first. One is so patent as to have attracted

² [But *Helix virgata* is one of the species which Mr. French has observed immigrating into Felstead. See his remarks below on the introduction of species.—ED.]

the attention of Essex naturalists for many years; I allude to the almost complete extinction of *Cyclostoma elegans*, compared with its great abundance in Roman and comparatively-recent times. This shell was thought to be now quite extinct in Essex, but in the year 1890 I found a small colony of them alive in Felstead, and they are still in existence (see ESSEX NATURALIST, vol. IV., p. 92). *Cyclostoma* is always, I believe, described as associated with chalk or limestone. In Essex this chalk was supplied by the Boulder Clay, or by the tufa which is formed by the re-deposit of chalk at places where springs issue. But the Boulder Clay is a wasting product, and is only occasionally found on the valley slopes, neither is it continuous over very large spaces on the higher ground,³ and where it is, drainage and other artificial agencies have deprived the snail of its shelter and broken up its colonies (always an important step towards local extinction), so that *Cyclostoma elegans* has now almost completely disappeared.

Another shell that is generally described as affecting a limestone habitat is *Helix lapicida*. This species is, I feel sure, verging also on total extinction, although still living in some parts of Essex. There are no data, so far as I am aware, to prove that it ever approached *Cyclostoma* in numbers, but there is sufficient evidence to show that its wide-spread distribution was due to conditions other than those now in operation. The stage of separation and isolation is now very far advanced, and *Helix lapicida* is always quoted as being local and in very small numbers. Where such a condition of distribution obtains over a very wide area, it is pretty clear that the species was once common in that area. I suggest that the wasting away of calcareous matter from the surface soil is a probable cause for the disappearance of this species.⁴ Perhaps the greatest factor of all here at work in bringing about local extinction is the drainage of the land; this affects the Molluscs indirectly in many ways. In former times, when even the uplands were sometimes sour morass, growing mosses in abundance, and the county was well wooded, a certain amount of moisture was stored up in the daytime, to be given out as aqueous vapour and received back as

³ In reply to objections by Mr. T. V. Holmes and Mr. Whitaker, that "the Boulder Clay is continuous over the greater part of N. Essex and forms the surface of most of the high ground," Mr. French remarked that in "my neighbourhood (Felstead) Boulder Clay is certainly not continuous. A reference to the geological map is misleading, because the map only takes into account the *subsoil*. Wherever tillage is in progress, the surface soil, which is that in which Molluscs work, is deprived of its calcareous ingredient."—ED.

⁴ The greatly-increased preservation of birds may account for the disappearance of some species of snails.—T. V. H.

dew at night. This allowed the Molluscs an excursion daily, and, in the long run, further peregrinations and a wider field for the distribution of species. In the arable and drained tracts of the present day, drought is much more prevalent, and dewy nights are possibly not so frequent; as a consequence, the snail is much limited in its range and opportunities. In short, where once the whole summer was humid, there are now only the heavy dews of the spring and autumn. We cannot tell whether the food is correspondingly diminished. There is a little evidence in that some species frequent gardens where young juicy vegetation is more predominant, but it is equally true that many species do not go into a garden at all.

A drained tract acts directly in breaking up colonies and isolating individuals. All travel instinctively away from the drained tract, and consequently, many travel in opposite directions, never to unite again. This sub-division goes on more and more as the colonies diminish, till eventually they die out, from want of opportunities to pair. There are two cases which are obviously due to the effect of drainage, in which two species of Mollusca, formerly very abundant in Essex, are now fast hastening to local extinction. One is *Helix arbustorum*, and the other is *Zonites purus*. Both require to live in very moist situations. I have been fortunate enough to hunt up three small colonies of *H. arbustorum*, and in one case I had seen the colony die out to its last member. *Zonites purus* is now only found as single specimens in my neighbourhood, and these are few and far between.

The shell-marls and peat-bogs of this district, although not extensive, are very instructive with regard to the proportions in which the various species are represented. Some of these marls enclose Roman and other remains, and we can therefore learn approximately their age. I here copy a table which I made out for this journal in 1889,⁵ in which I have made a slight alteration in the cases of *H. arbustorum* and *Cyclostoma elegans*, required by the subsequent observations alluded to above. I believe that in other respects it is correct. It will be seen by this table that local extinction may be a somewhat rapid process at times:—

⁵ "On the Mollusca of the Shell-Marl occurring at Felstead and in other parts of Essex."
—ESSEX NATURALIST, vol. iii., p. 14.

SPECIES.	PAST DISTRIBUTION. ⁶		PRESENT DISTRIBUTION.	
<i>Helix lamellata</i>	...	Frequent	...	Locally extinct.
<i>Pupa ringens</i>	...	do.	...	do.
<i>Helix carthusiana</i>	...	Occurs	...	do.
<i>Clausilia rolfhii</i>	...	do.	...	do.
<i>Vertigo substriata</i>	...	Frequent	...	do.
<i>Zonites fulvus</i>	...	Occurs	...	do.
<i>Cyclostoma elegans</i>	...	Common	...	Only a small colony existing.
<i>Helix arbustorum</i>	..	do.		Very rare; probably becoming locally extinct.
<i>H. aculeata</i>	...	Occurs	...	do. do.
<i>Aeme lineata</i>	...	Frequent	...	do. do.
<i>Vertigo antivertigo</i>	...	Occurs	...	do. do.
<i>Cochlicopa tridens</i>	...	Frequent	...	Rare
<i>Zonites purus</i>	..	Common	...	Rare

Turning our attention to the Freshwater Molluscs, other agencies affecting extinction may be assumed to come into play. Reduction of quantity of suitable food may be one factor, but of this I have no good evidence to offer. As regards lowering of temperature, something may be said. One species, at least, found readily in the ancient river alluvium, is now rare or locally extinct, although it still flourishes as the water becomes deeper towards the estuary. This is *Neritina fluviatilis*. The conditions under which the alluvium was laid down were those of stiller and deeper, and therefore, perhaps, warmer water; *i. e.*, not so readily affected by cold springs, which now appear to act as a deterrent of both animal and vegetable life, and of which I could instance many examples.⁷ Other species have been known for many years in the lower reaches of the river, but they have been unable to make any progress up stream. Two or three species deserve particular attention among those that are dying out. These delight in ascending ditches that have an immediate communication with the river. Such are *Succinea putris* and *S. elegans*, *Limnaea palustris*, *L. truncatula*, *Planorbis carinatus*, *P. contorta*, &c. The *Planorbis* will flourish, even though their river-communication be cut off, but my experience is that

⁶ In the shell-marls and peat which, as shown in the paper on the Felstead Shell-Marl above referred to, were accumulating down to Roman times. They in this district all overlie gravels.—J. F.

⁷ [We have no evidence of any reduction of temperature in recent times; but drainage and the development of agriculture would certainly affect plant life and the increase or decrease of particular species.—T. V. H. As to evidence of reduction of temperature, Mr. Christy's remarks, in his recent paper on "Essex as a Wine-producing County" (*ante* pp. 44-46) may be usefully borne in mind.—Ed.]

Limnæa and *Succinea* are then at a decided disadvantage. I have carefully noted the case of both species of *Limnæa* above mentioned. *Limnæa truncatula* is always ready to take an excursion on wet grass, but *L. palustris* will not go beyond the wet mud on which it delights to repose; and what is more, it does not here live with other than a river-communication. Both may be described as marsh species, and the drying up of marsh land affects them equally. A small colony of *L. palustris*, var. *corvus*, is here (at Felstead) reduced to probably less than a dozen members. I saw one of these pairing with an individual of the normal type—a sure sign of its diminished numbers. The pond fauna also, from the circumstance of increasing limitation, is gradually giving in.⁸ *Limnæa stagnalis* of the normal type is now very uncommon; the variety *fragilis* is much more plentiful; both have forsaken the river. *Planorbis carinatus* appears to have nearly forsaken the river also, although it is common in such ponds as we have here.

These instances will show that our Freshwater Molluscs undergo the same mutations of distribution as their land kinsmen. Taking mine as a fair locality, we find that local extinction is in constant progress.

We have now to turn to the other side of the question, and see what we have in the way of introduction to counterbalance the loss of species becoming extinct. It is obvious that where whole families are unable to exist on account of unfavourable conditions, there is but little hope of new arrivals establishing themselves, assuming these to require pretty much the same conditions as the old members. Nevertheless, we are not quite without examples of the immigration of species not native of the locality.

The introduction of a species is not a matter of common observation, but I have had the good fortune to witness what I believe to be a great local increase of one species—*Helix virgata*. It came in from the north, apparently, and the great army is still to be found a few miles in the rear of the outposts: but it is most certainly moving southwards, and, I doubt not, will pass over this part of Essex like a slow-moving wave. Then, again, among the aquatic species I have, I think, been able to trace a

⁸ ["Drainage has, no doubt, been carried out very largely during the past three or four years. On the other hand, the disuse of the Chalky Boulder Clay as manure has caused the marlpits to become ponds, which are extremely numerous in a C. B. Clay district—as may be seen N. of Chelmsford."—T. V. H. On this Mr. French remarks, "Our marl-pits at Felstead, as a rule, do not contain water, they having been dug through to the gravels."]

slight advance in my direction of the two species of *Paludina* (*vivifera*). They are now divided from my neighbourhood by an insignificant watershed.

A history of the "old," but geologically recent, marls does not give much evidence in favour of new arrivals since that period; almost all our present species are found in these deposits. I cannot, however, trace the species I have named as new arrivals in any of the Essex lists of the marl fossils, nor have I found them myself; and as they are conspicuous forms, we may safely conclude that they did not live in the neighbourhood at the time these marls were deposited. I am credibly informed that *Helix aspersa* does not occur in the older marls, and among the smaller species there may be some other instances.

We have a few species now that occur in extraordinary abundance—several of the *Helices* and *Zonites*, some species of *Pupa*, and among the Freshwater forms some species of *Planorbis*, *Bythinia*, &c.

In considering the variations and wanderings of Molluscs, many factors enter into the problem, the values of which are not themselves well understood. Thus we say, and on good evidence, that a species will remain unvaried and without appreciable change of distribution for an enormous length of time. Some, possibly, go further in saying that the gregarious habits of Molluscs tend to this fixity in that it gives facility for perpetual intercrossing, and so keeps them bound to an average type. But, on the other hand, we are acquainted with numerous variations which may also, to a certain extent, be due to these gregarious habits. We cannot tell how these variations are set up—whether it is due to the preservation of some variation in a diminishing colony, or whether it is due to the change of food and environment in a full colony. Again, as to their wanderings. Like plants, they are sometimes found having a time of introduction, culmination, and decay. Some spread themselves over a whole tract of country; others confine themselves strictly to a circumscribed locality. We conjecture that the supply of food is directly concerned in these wanderings, and the more one notices the habits of Molluscs, the more one becomes impressed with the idea that snails are very fastidious creatures; it is certain that they will in some cases prefer starvation, or rather hibernation, amounting to death, rather than make any material change in their diet or be greatly disturbed in their habitat. If

therefore, the food, &c., does affect the distribution and the distribution does not affect the perpetuation or loss of a variety, we have here an important factor, of which probably but very little is known.

NOTE.—Since writing the above I have obtained additional evidence as to the local distribution of *Helix virgata*. I have found it in great numbers at another point about three miles west of Felstead. As, however, there is not a scrap of evidence that I am aware of to show that it has ever lived at Felstead, I must still regard it as an incoming species.

Many other species occur in patches, as it were, at distant intervals, but they are always, so far as I know, joined by here and there an individual. This is certainly not the case with *Helix virgata*, and on such grounds, and in the entire absence of fossils, I must hold it to be a new comer.—J. F.

[Mr. French ended by giving some observations on suggested causes of variation in the Mollusca. But speculations on this most difficult subject, in the absence of long-continued experimental observation, are of little or no value. We must await the establishment of the inland Experimental Biological Station, which, it is to be hoped, will one day be founded.—ED.]

A SUPPOSED NEOLITHIC SETTLEMENT AT SKITTS HILL, BRAINTREE, ESSEX.

By the REV. J. W. KENWORTHY, Vicar of Braintree.

WITH REMARKS ON THE ARCHEOLOGICAL OBJECTS, BY F. W. READER; ON THE GEOLOGY OF THE DISTRICT, BY T. V. HOLMES, F.G.S., F. ANTHROP. INST.; AND ON THE OSTEOLOGICAL SPECIMENS BY E. T. NEWTON, F.R.S.¹

[Read February 25th, 1899.]

The District, and Preliminary Remarks.

ON the south side of Braintree there is a small stream, or rivulet, mentioned in recent books and spoken of in common parlance by various names—the Pod; Pods Brook; the Bran; the Brain, &c. In Muilman's *History* it is called the "Stour." We read, "The river Stour waters this parish, over which there are three bridges—one on the road to Witham; another on the road to Chelmsford; and a third on that to Dunmow." It is below the first of these bridges that in very early times—in fact, soon after the cutting down of the valley to its lowest depths—that a Lake or "Broad" began to be formed by the silting up of the stream along nearly the whole of the present plain between the narrow hills which here form a gorge half-a-mile or so in length.

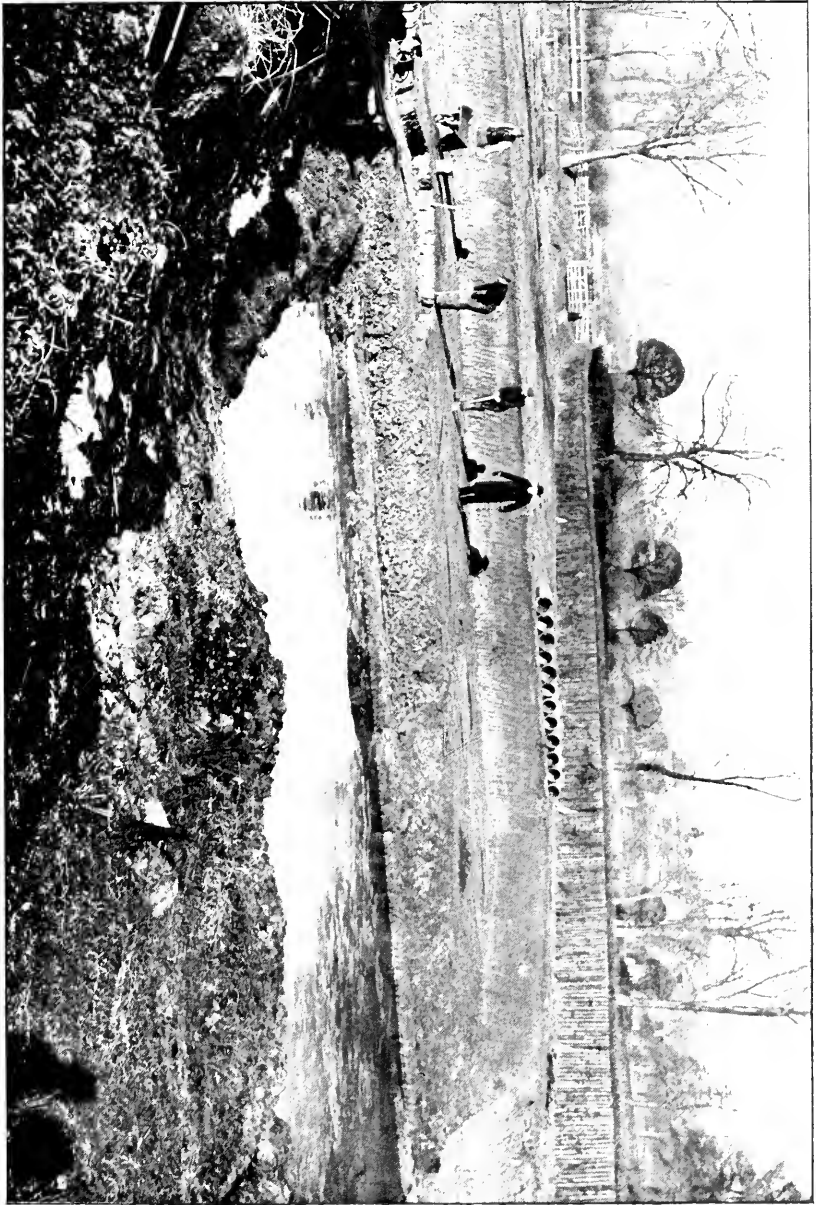
VIEW OF THE SKITTS HILL SITE OF THE LAKE DWELLINGS (*Plate I.*)

The view is taken looking N.W., and shows the extreme end of the excavations for brickearth; beyond the palings the present river runs. The building on the highest ground to the right is 210 feet above Ordnance Datum. The water shown in the photograph stands at 6ft. 6in. from the surface soil. Below the level of this water, from 6ft. 6in. to 9ft. is the bed of slime, mud, peat and wood containing the relics of the lake-dwellers. In the level where the men are working are found Roman tiles, and above this level horse-shoes and modern pottery. In front of the photograph the heaps are of wood-ashes and refuse of long-continued fires for domestic purposes, thrown out of the pit where the water now stands.

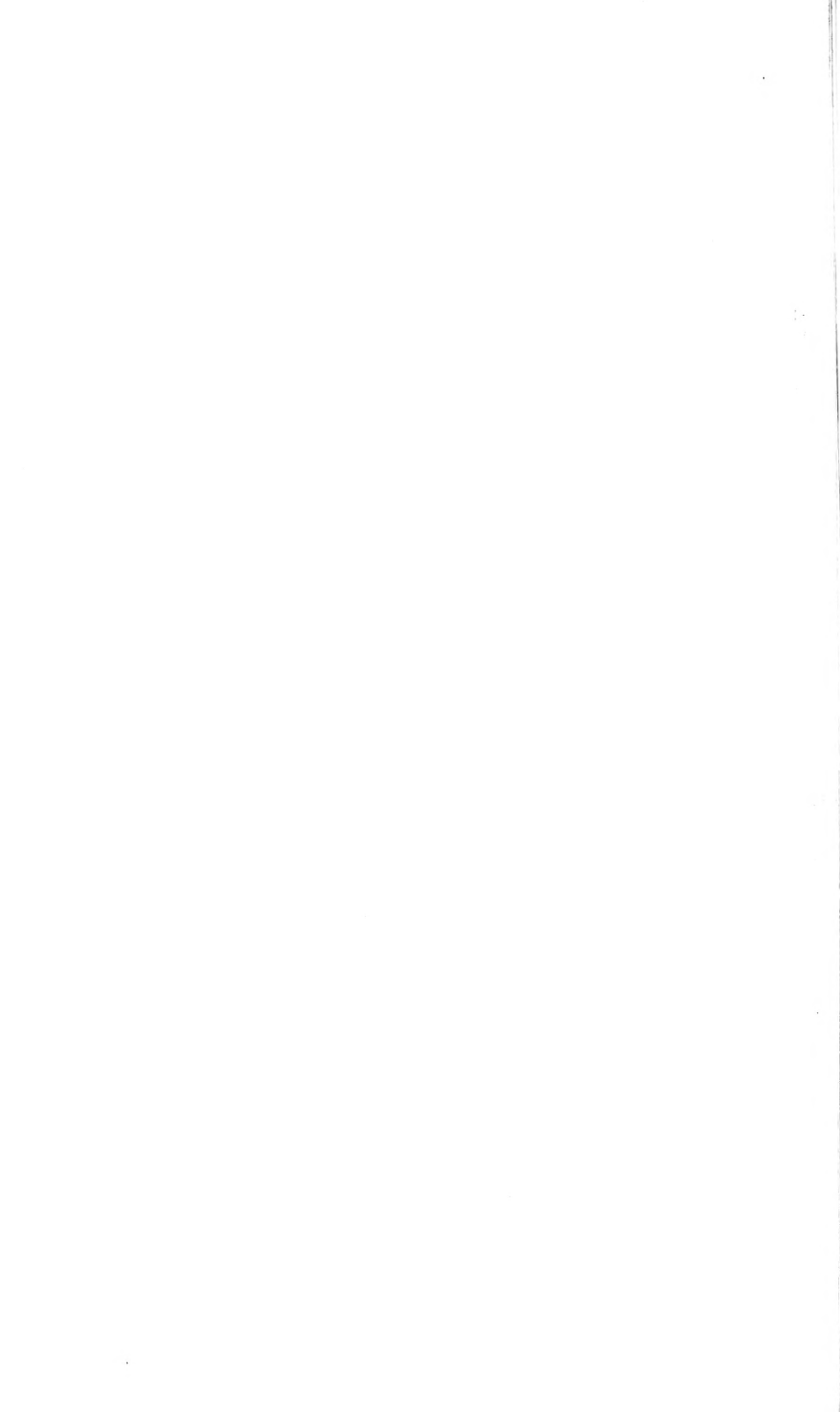
The excavation is on the right slope of the foot of the valley; to this slope the wheel-barrow is directed.

These excavations were begun about 30 years ago, at about a thousand yards lower down the stream. J.W.K.

¹ [The Author and Editor have to acknowledge with gratitude the great assistance of the above-named gentlemen in the revision of this paper and in preparing it for the press. Mr. Reader has not only visited the locality several times, but has consulted with Mr. Kenworthy and the expert authorities at the Geological and British Museums, and has also prepared all the illustrations. Mr. Holmes has written and advised on the geological questions arising, and has visited the spot on two occasions. Mr. E. T. Newton, F.R.S., has in the kindest way examined all the osteological specimens. The appended initials of the above-named gentlemen indicate any notes added by them to the text. In addition to the above Mr. C. H. Read, F.S.A., and Mr. F. W. Rudler, F.G.S., have most courteously advised on special points. - Ed.]



View of the site of the supposed Lake Dwellings at Skitts Hill. Explanation in text.



This is only one of the numerous patches of low ground in Essex which were, in all probability, inhabited by man during the stone-age. And this early race of settlers, judging from the remains of their domestic animals and their manufactured implements and other relics, were probably in the same state of civilization with the Lake-dwellers of the Continent, those of Switzerland, Holland, and Brittany. It is not in the deep alluvial beds alone that their relics are met with, but on the surface of the land, everywhere scattered, worked flints are found, which belonged to the same people, no doubt. It is, however, beneath the soil, buried during the countless years of the accumulation of the alluvial valley beds, not only that the most numerous traces of the early race are brought to light, but also it is in these gradually-formed beds that we obtain a clue to the *order* of the deposits, beginning with the lowest, and tracing the successive accumulations upwards. Thus, while the surface relics have been scattered and intermixed with earlier and later remains, the alluvial mud has been the vehicle for the preservation and transmission to our own times of relics in the order of time and place in which they were left. Next, then, to the discoveries made in the British Barrows and in undisturbed burial grounds, these deposits formed by the present rivers and periodical floods are most important for records of facts relating to the life and manners of man in prehistoric times. For the last fifteen years I have been on the look-out for any excavations going on in this neighbourhood. Among others, I learned that for a long time—more than twenty years previously—Brick-earth, for the purpose of manufacture, had been taken out at Mr. James Brown's works at Skitts Hill; that animal remains and worked tools and implements obtained from these grounds were in the possession of some few local persons, while, doubtless, others had been overlooked or allowed to fall again into oblivion. I am able to say that during the period above alluded to, every relic that has turned up has been scrupulously preserved, and, through the liberality of one or two other observers, and by instructions given to the workmen, all the recent finds have come into my possession. It was at the exhibition of these specimens (in part) at Brantree Vicarage, at the meeting of the Club on October 1st, 1898, that much interest was created, and a wish was expressed that I should write an account of my discoveries for the *ESSEX NATURALIST*.

The topography of the site and its surroundings is shown in

the portion of the 6in. Ordnance Map printed with Mr. Holmes' remarks on page 123, and more precisely in the Plan drawn up by Mr. Reader, on the 25in. Ord. Scale, with the accompanying explanations (page 97).

The Relative Position of the Alluvial Beds.

This will be best understood by a reference to the diagrammatic outline sketch of the order of the deposits which I have drawn up (see diagram on p. 98) and to the Relic-Table on page 103. I have divided the Brick-earth, including the sandy ballast bed at the base, into five layers. Commencing with the lowest, the beds are reckoned in upward order. Below all these lies the London Clay, and on

EXPLANATION OF PLAN. FIG. I.

The shaded portion adjoining the river represents:— from A to C the part excavated before Mr. Kenworthy's arrival in Braintree; from C to D the part excavated under Mr. Kenworthy's observation; from D to E a portion of the layer No. II. uncovered to the 9ft. level and about to be excavated. From E to F an unexcavated portion of the beds. F to G a small portion dug out to the lowest level.

The distribution of the principal relics is as follows:—

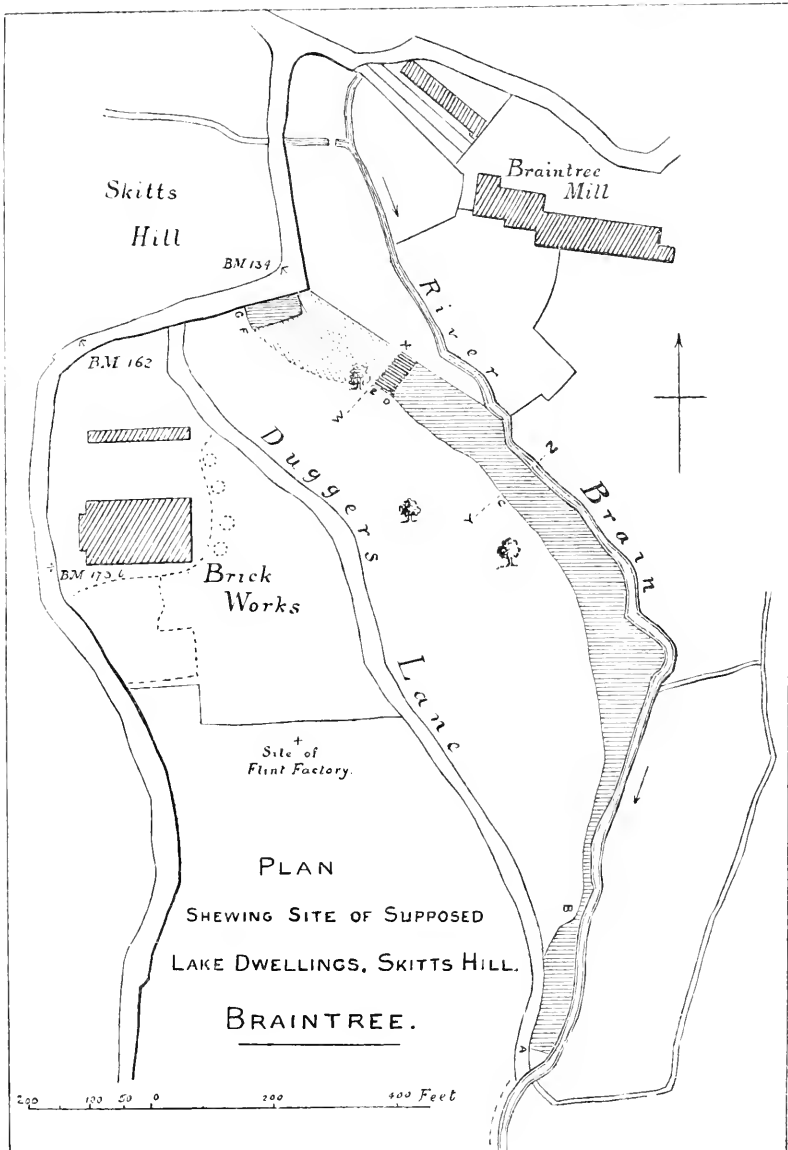
- A—B. The flint knife (fig. 7). The workman says that more relics were found in this end of the excavations formerly, than at present.
- B—C. Red deer skull with antlers sawn off (*Plate II*). Human frontal; antler haft (fig. 9).
- C—D. Three red deer antlers, possibly used as picks. Bone handle (fig. 14). Antler handle (fig. 11).
- F—G. Flint arrow-head (fig. 8).

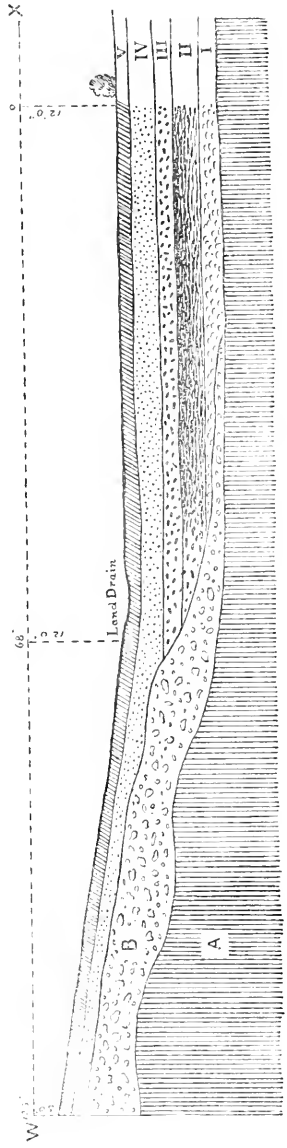
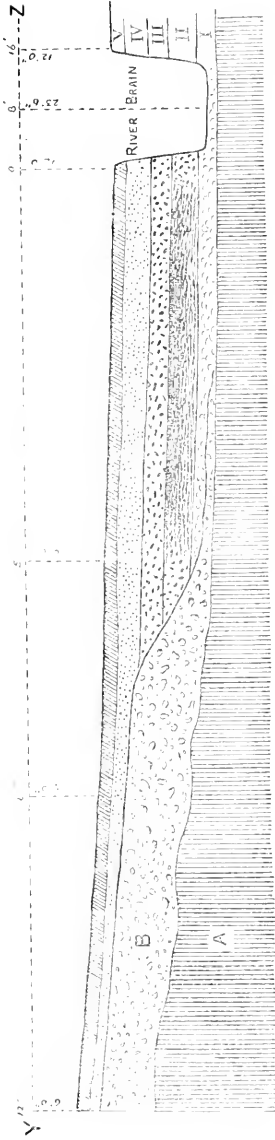
F.W.R.

the slopes of the valley, at a little distance from the river, there is a Pleistocene Brick-earth deposit, from which mammoth bones and Palæolithic "flint-flakes" have been taken by myself. The mammoth tooth, with bones of ox and horse, are in my collection previously deposited at the Field Club's Museum.

I.—The Ballast. This is the sand and gravel of the early river-bed, previous to the silting up. The place of this first bed is eroded out of London Clay.

II.—This constitutes the Neolithic [?] Bed where the earliest relics in point of age are found. It is partly made up of peaty clay, black mud, and sand, and the accumulations of the *débris* of the Lake-dwellers. It contained the objects which I shall describe below. The depth from the turf is about 6 feet, and for about 3 feet it contains stone-age relics.





Scale of Feet 0 2 4 6 8 10 20 30 40 50 60 70 80 90 100
 FIGS. 2 and 3. Skitts Hill.—Diagram-sections showing the order of the Deposits.
 (For explanation see opposite page.)

III.—This bed is about two feet in depth, and contains Late Celtic Pottery.

IV.—Romano-British objects occur first at about a depth of four feet. I think that the silting-up has been much more rapid since the occupation by the Romans, owing, probably, to the destruction of the forest and its undergrowth, the land cultivation, and the baring of the virgin soil. Bearing this consideration in mind, we may say that the pre-historic accumulation was, perhaps, ten times slower than the Roman, and that of recent years much more rapid than the Roman and Mediæval.

V.—This is the Post-Roman and Mediæval layer, and here iron horse-shoes occur in numbers, with fragments of glazed pottery.

EXPLANATION OF SECTIONS. FIGS. 2 AND 3.

Section I. on line Y Z of Plan (p. 97) was taken on the spot when Mr. Kenworthy's observations commenced. At this point the digging is carried to the present river's edge.

Section II. on line W X of Plan, marks the point to which the excavations have reached. The cutting stops at the hedge some 50 feet before reaching the river.

The Relic-bearing Bed No. II. is shaded darker at the top to indicate that more traces of fire have been noticed here than in the lower parts of the bed. The shading dies out as this bed approaches its old shore, and the present river to show the extent of the artificial mixture (*Packwerk*).—F.W.R.

B. Pleistocene Brick-earth. The original Lake or River bank.

A. London Clay.

Site of the Dwelling-places.

If it be necessary to show that *upright* piles were found *in situ*, on which a platform of wood could be erected by the dwellers, in order to prove that the Skitts Hill site was a Lake-habitation, I cannot say for a certainty that it was so. Many of the logs of wood were found in a leaning position; the stems of trees, deprived of their roots and torn-off branches, amounted to hundreds. The logs were placed in position by man, and they were staked and secured in their place from the scour of the floods. Among the *debris*, logs of various woods, such as fir, spruce, elm, beech, oak, birch, abounded, and maple in small pieces. Speaking generally, the oak remains are quite hard and sound, and some pieces were much harder than in the fresh condition. The Faggot or "Fascine" Dwellings at Skitts Hill, I believe to have been contemporary with the Pile-dwellings. Both kinds have been found in many parts of England, as well

as in Holland, in Brittany, and Switzerland, and with them are associated relics of the stone-age, while the dwelling-places themselves continued to be occupied in later times. At Skitts Hill an artificial floor was raised above the level of the water. This floor was carefully formed by mixing together clay, sand,

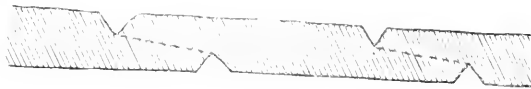


FIG. 4. Diagram of suggested method of shaping wooden stakes.

gravel-stones, brown mottled clay, and chalky boulder-clay, forming a mixture which could only be produced by human contrivance and human hands. To support and secure this artificial concretion, wooden stakes were driven into the ballast of the lake or river. Outside the raised platform there was still water, in which the peaty mud has accumulated until it has levelled all up; and it was, no doubt, into this water which surrounded the floor on which the huts were built that numerous relics fell, or were swept by the dwellers. So large was the quantity of wood and other material used to construct this platform, that in the course of years some tons have been dug out by Mr. Brown's workmen, and afterwards returned to fill up the excavations. The distance of the platform to the land was about 10 feet; I measured it as nearly as I could. In one



FIG. 5. End of pointed stake, probably made in the manner mentioned in text. One-fourth natural size.

instance, an oak tree had its stem, without root, about 15 feet long, set towards the land, as though to form a gangway.

The artificial relics found at this level belong to an age prior to the use of metal. [? Ed.] The method employed for splitting and parting the timber into lengths shows the use of bone or

stone tools only.² For instance, logs of oak, four or five inches in diameter, may have been divided across in the following manner:— A deep cut was made on each side of the log at distances nearly a foot from each other; then the timber was smashed into two by some heavy weight, perhaps a log of wood, being let fall on the weakened part, fig 4. This idea of the method employed is suggested by a cut stake which has been preserved (see fig. 5). And the other drawing (fig. 6) represents how such a stake may have been employed. The result was two pieces of timber with staked ends. The number of split logs and thick planks found was also very great. The description given by Dr. Keller, in his *Lake Dwellings of Switzerland*, applies well to the methods I

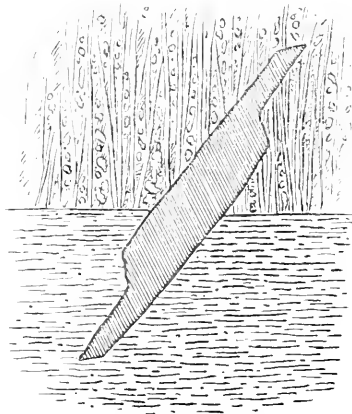


FIG. 6. Suggested plan of employing roughly pointed wooden stakes.

suppose to have been employed at Skitts Hill in the fashioning of the fascine dwelling-places. We read thus (Vol. I, pp. 6-7):—

“Some Lake-dwellings were not supported upon piles, but rested upon layers of sticks, or small stems of trees, built up from the bottom of the lake, till the structure reached above the water mark, and on this platform the huts were placed.”

“The Crannogs of Ireland and Scotland were built up from the bottom of the lake, on the soft mud, exactly in the manner of fascine dwellings of Switzerland. The bed for the floor is a mass of ferns, branches, and other vegetable matter, covered over with a layer of split or round logs, and above this a quantity of clay, sand, gravel, and stones.”

The above is an exact description of our Braintree dwelling-places. The mass of leaves, sticks, nuts, acorns, &c., found mixed up with the clay of the platforms, looks like stuff gathered

² [This is, however, a doubtful point; see Mr. Reader's remarks at the end of the paper.—Ed.]

up in the autumn from the forest floor; and this was done, no doubt, each year, in order to form a fresh floor for the winter. In this way we may account for the immense quantity of vegetable matter brought together. There is no evidence to show whether the platforms were rounded or square, but it is certain that they did not extend far into the lake, and that they were placed within easy distance from the land side and were joined to it by a faggot road made like the raised floors. These dwellings, and the occupation of them, lasted so long as to come down to the period when finer clay for pottery was used, with vessels of thinner walls, more perfectly burnt, and of a more graceful form and when cooking was carried on in earthenware pots. Probably, some kind of occupation continued with the un-Romanized inhabitants of this part of Britain, down to the end of the Roman period, judging from the numerous objects of the Romano-British period, found in the layer (No. 3) above.

LIST OF THE VARIOUS ARTICLES FOUND IN THE EXCAVATIONS
AT SKITTS HILL.

The objects which have been preserved, and which I have presented to the Essex Field Club, may be classified as Human and Animal Remains, Stone, Bone, and Wooden Implements, and Pottery.

Of the first the only specimen found in the relic-bed was a *Human Frontal Bone*. There is a lineal mark across the forehead, which Mr. Newton considers to be merely an iron stain, and not a healed fracture, as was at first imagined.

Animal Remains—Bones.

The bones of animals which have been identified may be treated under the heads of (a) Wild animals and (b) Domestic animals. Such of the wild animals as were found were common in Britain during the Neolithic age, and were, no doubt, abundant in the forest lands adjacent to our settlement. Some survived into Roman times, but most of them have been long absent from our district.

THE CELTIC SHORT-HORNED OX (*Bos longifrons*).—This is abundantly in evidence in the shape of various fragments. Several specimens of the upper part of the skull, of limb bones, many of these being fractured or split, possibly to obtain the marrow.

A LARGE OX. - Some bones of a much larger ox have been found, but it is not certain that they represent the URUS (*Bos taurus*). These bones must have belonged to animals much

larger than those of the *Bos longifrons*, too large, one would think, to be easily domesticated by the Stone-age folk. Yet the animal seems to have been captured, and apparently used for food. They were mixed up with the wood of the relic-bed.

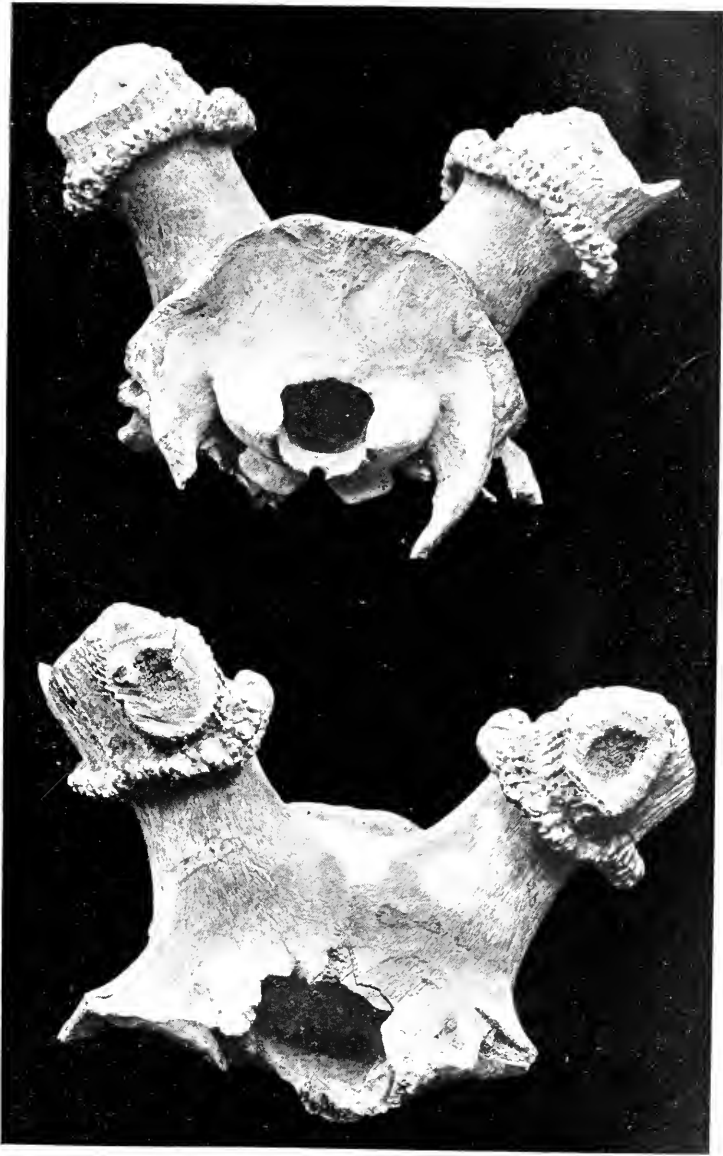
RELIC-TABLE—SHOWING THE ORDER AND NATURE OF THE DEPOSITS AND OBJECTS FOUND.

No. and Depth of Layer.	Period.	Order and Nature of the Deposits	Relics.
V. 1ft. 6in.	MODERN and MEDIEVAL	SURFACE SOIL BRICK EARTH.	Glazed Pottery and Iron Horse-shoes.
IV. 3ft.	ROMANO- BRITISH.	BRICK-EARTH & VALLEY SILT, ORGANIC OBJECTS NEARLY ABSENT	Flue-tiles. Fragments of Pottery coarse and fine. Oyster shells.
III. 2ft	PRE-ROMAN	SANDY CLAY & CLAYEY EARTH with SELECTED PEBBLES	Fragments of Early and Late Celtic Pottery, thin, gritty, wheel-turned and kiln-dried. Chiefly used for cooking. The Bones in this section are friable and earthy, many too decayed to be preserved. Large ox, horse-teeth and limb-bones.
II 3ft. 6in.	NEOLITHIC. This is the bed referred to in text as the "Relic-bed."	LAKE MUD with DECOMPOSED OR- GANIC MATTER. ARTIFICIAL PLATFORMS raised to the level of the original Lake or River, and resting on the BALLAST (No. I	Human frontal. Bones of Ox, Red and Roe Deer, Goat, Wild Boar, Pig and Dog. Flint knife; flint arrow-head; three antler-implements; three shed antlers (? picks); two bone handles; wooden implement. Large quantities of nuts, acorns, wood split and cut; charcoal, ashes and burnt flints.
I. 2ft.	POST-GLACIAL. The Bed of the River	RIVER BALLAST SAND & GRAVEL	
B.	The original Lake or River Bank	PLEISTOCENE BRICK-EARTH	A few large Pleistocene Bones, teeth of Mammoth and Palæolithic flints.
A.		LONDON CLAY.	Some large Erratics, quartzite and conglomerates, resting on the surface.

THE STAG OR RED DEER (*Cervus elaphus*) is well represented by its antlers and bones. It was never domesticated; its shed antlers were, no doubt, brought into the dwellings from the forest to serve various purposes, such as the making of tools or weapons. It is much more uncommon to find the skull with the antlers attached, than to find the shed antlers, which were probably picked up in the forest. The strength and ferocity of the stag made it difficult and dangerous to capture by men armed only with weapons of bone, wood, or stone. There must have been great necessity for the unshed antlers in making flint hafts, to induce men in those days to capture the animal and take the great trouble to saw off the antlers from the head. The unshed antler, from its denser condition, would be more serviceable for the hunter's use in the making of handles for tools and implements, than the lighter shed antlers.

[Amongst the remains of this animal is a cranium wanting the whole of the facial portions. (See Plate II.) The frontal bones have been crushed in, but probably since the animal's death, as it would be difficult to strike this spot when the creature was alive and with the brow tynes perfect. The antlers and brow tynes have been *sawn* off just above the "burrs," which still remain and are very rugose, indicating well developed antlers. The marks left by the saw are rough and irregular, showing that the saw was a coarse one and the operator not skilled in such work; but at the same time these marks could only, I think, have been made by a metal saw.—E.T.N.]

THE ROE DEER (*Capreolus caprea*).—Compared with the Red Deer, the Roe is scarce at Braintree, but I have the right under-jaw of a very aged animal, with perfect molars in place, interesting in showing signs of long use, being much worn. This jaw, I believe, was found in the relic-bearing bed No. 2, 9 feet down, but it is quite possible that it may belong to the underlying Pleistocene bed. Detached pieces of antler were found, which had apparently been put to some manual use, and were probably adapted from shed antlers. In one case I have secured, from the relic-bed, a pair of antlers of this graceful creature, which was abundant in the Essex Forests in pre-Roman times, but probably was soon afterwards extirpated. The horns in this case are as fresh as in the life-time of the bearer of them, and as firmly attached to the skull; the skull has been apparently, trimmed off, as is the fashion of mounting antlers in recent times. Why should not Stone-age man have



Cranium of Red Deer, showing places where antlers and brow tynes have been sawn off. For explanation see text.

treasured the signs of his conquests, as the Central African and North American continue to do to this day, and have done from the earliest ages?

GOAT (*Capra hircus*).—[A skull in a fair state of preservation, with tolerably long horn-cores, is an undoubted representative of this creature, and a piece of a pelvis most probably is referable to the same form.—E.T.N.]

WILD BOAR (*Sus scrofa-ferox*).—Found at the 9 feet level. [The Wild Boar is evidently represented by the anterior portion of a very large lower jaw, with extremely powerful tusks. One of the tusks measures 26.5 mm. across the inner and curved enamelled surface at the base, and 200 mm. long round the outer curve, a half of which protrudes from the jaw. Another piece of a lower jaw of a much smaller and younger animal, as well as a tibia and a foot-bone, are all the remains of this species that have come to hand. Some of these remains may have belonged to domestic animals.—E.T.N.]

THE HORSE.—The horse does not occur in the relic-bed; it is only in the middle or upper stages of the alluvial deposit that these bones are met with. We have the limb bones, upper and lower jaws of several individuals, and teeth were plentiful. Some of the bones seem to have belonged to a smaller animal. (Query—pony or ass?) There is a variety in the size of the limb bones and teeth.

DOG.—Portions of two skulls, perhaps of three. One skull is $6\frac{1}{2}$ inches from the occiput to the muzzle, and the animal would have been about the size of a modern collie. The bone was at first jet black; it was found on the bottom of the relic-bed. There are also the femur and tibia of a large dog or wolf.

Human Workmanship; Remains of Burnt Bones, and Charcoal.

The traces of human workmanship are apparent upon a large proportion of wood, bone, and other fragments found in the excavations. In connection with fire employed by the dwellers, it is important to observe the large quantity of ashes and charcoal, with calcined pebbles and "pot-boilers," at the bottom of the lake and upon the platform upon which the huts were built. Much blackened debris was thrown out by the inhabitants of the huts, and sank into the marsh. Signs of workmanship abound in the squaring, splitting, and pointing of logs, chopping of stems, and

pointing of stakes. Not much of this material could be kept for inspection; large stems and trunks of trees—elm and oak—were thrown back into the excavated pit. But I have saved a few stakes, showing careful pointing. I have cut up some of the oak and polished pieces, as examples of solidity and fine material, of which bog-oak ornaments might be made. I took sketches of oak poles cut partly through on each side, and then broken in two, so as to furnish a pair of pointed stakes from one piece. I have still an oak pile, pointed at both ends, measuring about 9 feet in length and 5 inches in diameter. The chopped-off twigs of all kind of woods then in growth are found mixed up with stiff clay, sand, and gravel, along with nuts, acorns, and leaves, to form the floor of the habitation. The prevailing twigs identified are of birch; the bark is still bright and glossy. The most decayed examples of piles and logs are of elm. I think that there is much fir. Yew is found, and the wood is still hard, and capable of taking a high polish. The oak stakes were squared and split in a rude and primitive manner.

Stone Implements and "Flakes."

No large celt of the polished kind has been found in the relic-bearing bed. A portion of a polished celt is in my collection at the Club's Museum. This was found near the site and on the bank of the Pcd brook. Numbers of finely-made and well-polished celts have been found in and near Braintree. I found two finely-chipped flint javelins, leaf-shaped, of the long or oval Barrow period, in conjunction with four polished celts of porcelain texture, at Kelvedon (these are in the Club's Museum). A javelin of exactly the same kind was found in the deep beds of the settlement associated with flakes and bones (see fig. 7). I therefore conclude that large polished stone celts belong to, and may yet be found at, Skitts Hill.

A Hammer-stone or Axe was found in the valley, on the surface, within a few hundred yards of the settlement. It is slightly damaged on the underside. It is in length 6 ins., 3 ins. wide in the middle, and brought to a blunt point at both ends; weight, 2 lbs.; made from a dark basalt or quartzite stone, rubbed to a smooth surface. This agrees with such as are found in Denmark, undrilled, and made to be used in the hand, without hafting, and it is identical with one in the Christy collection, British Museum.

The following implements were actually found *in* the Relic-bed:—

FLINT KNIFE OR DAGGER.— [This very fine implement was found in the early period of the excavations in the part marked A—B on the plan (page 97), and is in the possession of Mr. Davis, the Head-master of the Board School at Braintree. Through his kindness I am able to present a photograph of it

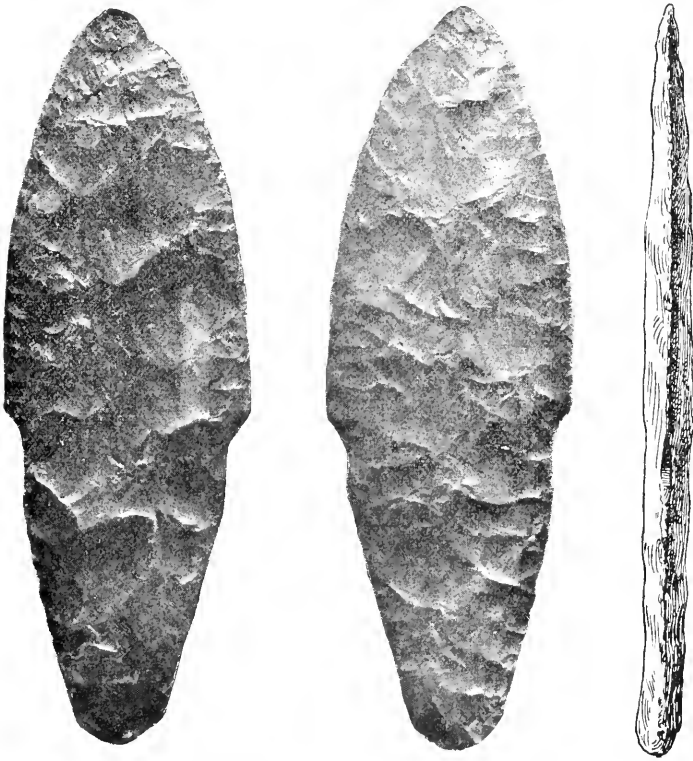


FIG. 7. Flint Knife or Dagger from Skitts Hill Two-thirds size.
With edge view of same.

here (Fig. 7). I have tried to persuade him to add this to the objects in the collection when they are placed in the Essex Field Club's Natural History Museum at Stratford. I trust that when he sees the other parts of the collection installed there he may do so. The implement measures $5\frac{3}{4}$ inches in length and 2 inches at the greatest width. A similar specimen is figured in Evan's *Stone Implements*, page 349, fig. 264.—F.W.R.]

ARROW-HEADS.—One finely-clipped, barbed and stemmed arrow-point is in the Skitts Hill collection (fig. 8). I found it here a few years ago. But such finely-clipped arrow-heads are very rarely turned up in the dwelling-place at Skitts Hill. Among the worked flakes, of which there are hundreds, there are numerous pointed ones of a size from $\frac{3}{4}$ -ths to $1\frac{1}{2}$ inches long, which may have been utilized for tipping arrows.

POUNDING - STONES.—Many water - washed pebbles were collected which exhibited signs of use.

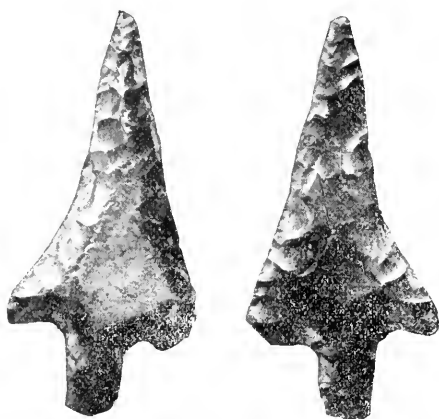


FIG. 8. Flint arrow-head from Skitts Hill. Full size.

SANDSTONE SHARPENER. — Square-sided and oblong $1\frac{1}{2}$ inches by 1 in.; length 4 inches; probably used for grinding; found with flints and worked bones in the bottom bed. The base rests steadily on a flat, the top is rubbed into a slightly concave surface, and has a finely-finished grinding plane.

FLINT FLAKES. — Numerous diminutive and delicately-formed flakes are found, for what purpose used it would be hard to say. They are of very varying forms, with sharp edges and bulbs of percussion, some only $\frac{3}{8}$ -ths inch in width, and $1\frac{1}{2}$ in. in length, have a clear bulb, butt, and sharp point, two sharp ridges, three facets, and two ridges on the upper side. Nothing in the way of worked flints can exceed them in delicacy. These very delicate flints may belong to the higher level of the

beds. I do not remember taking them from the peaty horizon, where the larger and stronger flakes were found *in situ* by me.³

The worked flints, chips and fine flakes, are so numerous as to suggest that the population was considerable, and that the dwellings were in close proximity to a manufacturing ground of these objects. On the southern slope of the valley, at an elevation of 30 feet, and a hundred yards distant, operations for excavating brick-making material are likewise in progress. The Brick-earth here is formed of rain-wash from the higher ground. In neolithic times the surface on the slope was about 2 ft. 6 in. below the present level. It is at this depth that flakes, identical with those in the dwellings, occur in large quantities, many of which are worked from rolled pebbles. These pebbles were evidently carefully selected. The cores are abundant on this valley working-ground, and not on other sites. The time that has elapsed since the flakes were worked has sufficed for the deposition of two feet of *Talus*, while the action of the river has accumulated six feet of alluvium. From the first I kept the two sets of flints separate, thinking that they might belong to a different period or race of men; now I feel convinced that both are from the same source. This point is of great interest, as it tends to show that the dwelling-places were in the bottom of the valley, surrounded by water, whilst the working-ground was on the slope.^{3A} Only the flints and very sparse scraps of pottery are found on the slope. The dry brick-earth may not have been conducive to the preservation of bone and wood. Sometimes a small "nest" of flakes, together with the cores from which they were struck, lay at a depth of two or three feet, while others were found scattered at intervals over all parts of the excavated brick-field. This was probably the result of long occupation by the settlers. They were therefore fixed to the locality at least some portion of the year, either summer or winter.

Bone and Horn Implements.

The most striking and important of these are such as are formed from the antlers of Red Deer. They appear to be

³ Mr. W. J. L. Abbott, in his three papers on the "Hastings Kitchen Middens," places these small implements in the bronze age. The suggestions of Mr. Abbott open out a chapter in the history of flint manufacture which is not touched in the standard comprehensive works on the subject. I do not think that they were worked out of our chalk flints. I have some very small flakes of the same kind from the banks of the Lea River in Hackney Marshes. See remarks on (and plates of) these minute implements in *Journ. Anthropol. Institute*, vol. xxv., plates 11, 12, and 13.

^{3A} See Plan, at spot marked "Flint factory site."

identical with deer-antler implements from the Barrows, Grimes Graves, and Cissbury, and can be matched with those figured by Canon Grenwell in his *British Barrows* (page 43).

[(a) A hammer axe of staghorn, perforated for a handle and bored for hafting an implement. Five inches in length. Fig. 9, Pl. III.

(b) A tool of unknown use. The surface has been scraped smooth and the end has been ground and polished, apparently from use. The centre part of this end has been slightly hollowed,

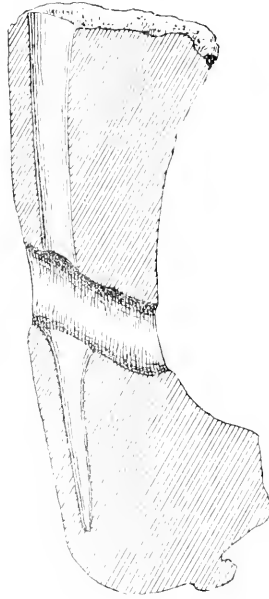


FIG. 12 Section of Stag-antler handle, illustrated Fig. 11, Plate III.

but not enough to suppose use for hafting. The perforation at the other extremity has apparently been broken. Length $5\frac{1}{4}$ inches. Fig. 10, Pl. III.

(c) Implement of staghorn, pierced as is usual with these objects, only in a transverse direction. Fig. 11, Pl. III. It has also a tapering, vertical boring running almost its entire length. (See section at Fig. 12.) The form of this implement suggests a handle of some metal tool, and also appears to be worn smooth by the grasp of the hand. It seems to be an uncommon type. Length $6\frac{1}{4}$ inches.—F.W.R.]

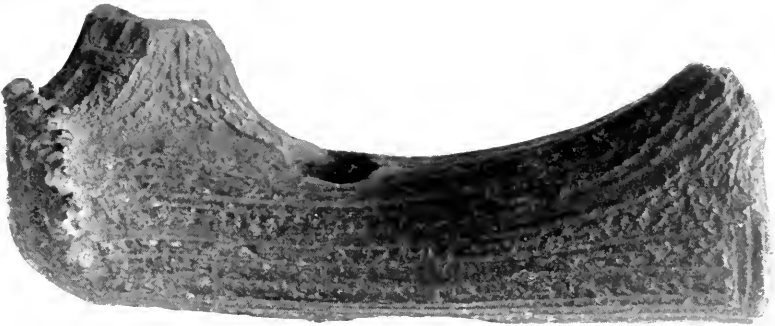
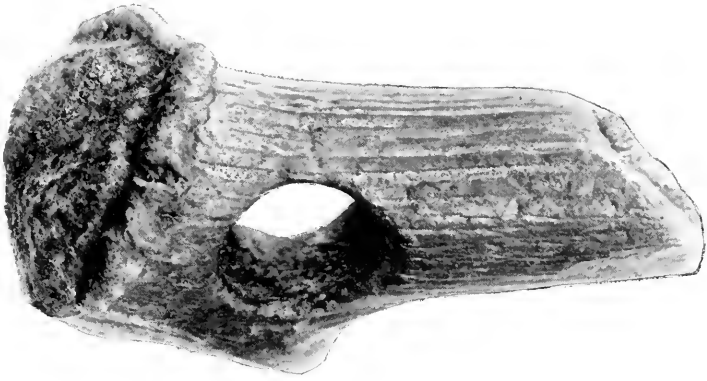


FIG. 9.
Three implements made from Red Deer Antlers.

FIG. 10.
For explanation see text.

FIG. 11.
Two-thirds natural size.

(g) Three hand hammers—one from the os sacrum of ox (circumference $10\frac{1}{2}$ inches); two others from the distal tibiae of the *Bos longifrons*. The surface is cut everywhere with a pointed tool of flint. This faint tooling is difficult to describe or to represent; but the same kind of workmanship will be found noticed in the description given of a Lake-dwelling discovered at Ehenside Tarn in Cumberland, which was first reported and described in an article by myself, and afterwards more fully treated by Mr. R. D. Darbishire, F.G.S., in the *Archæologia*, vol. xliv., pp. 273, 292. The work seems done with a sharp-pointed flint, and carefully chiselled over by even short cuts.

Wooden Implements.

These may have been numerous during the stone period, as, for example, to supply the hafts for drilled horns, &c.; but



FIG. 14. Bone handle. Two thirds natural size.

owing to such relics being mixed up with leaves and branches, the workmen would not readily discover or distinguish them from the surrounding pieces of natural wood.

(a) An implement of maple (Fig. 15), measuring 4 feet 7 inches in length: greatest width $2\frac{1}{4}$ inches, and narrowest width $1\frac{1}{2}$ inches; of a thickness to suit the hand, sharpened to a spear-point at one end, and rounded at the butt, with hand-grips for use as a spear or more probably as a paddle. Only few of similar implements have come into the collector's hands, and from experience I can say that care must be taken in drying and soaking such relics in glycerine, to save them from warping and cracking, or even perishing altogether. This process has been adopted with the implement now described, and the result is its almost perfect

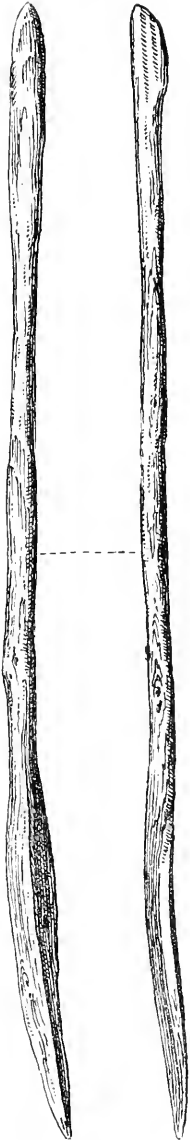


FIG. 15. An implement of maple wood from Skitts Hill. One-ninth full size.

preservation. Beyond the pointed stakes, the spear, and wedges, no other wooden instruments have been discovered; but the tree stems deprived of their roots, the larger branches deprived of twigs, and the twigs cut into short pieces from 2 to 5 or 6 inches were dug out all along the line of the dwellings in large quantities and returned for filling in the pits.

Pottery.

[The only pottery which has been definitely recorded as coming from the relic-bed are some fragments of thick grey ware. The portion of the base which is represented in Fig. 16, is rough and coarsely made, but cannot with certainty be said to be hand-made. The other fragments appear to belong to the same vessel, but bear evident marks of being wheel turned.

Of the unrecorded pottery there is one fragment which appears to be of the Bronze-age quality, red and apparently hand-made, but not ornamented. All the other fragments are the ordinary Late Celtic or Romano-British specimens. Some of these are supposed to have come from the relic bed, but as an exact record has not been kept they cannot be included.—F.W.R.]

ROMAN POTTERY.—This occurred in the higher level (No. IV. on Section, p. 98) from a depth of 1ft. 6in. to 4ft. 6in. from the surface. It consists of earthenware, perfectly burnt, and similar to that found commonly in places of Roman occupation. It is all in a very scrappy state, as if broken and thrown away as refuse. Flue and roof tiles, the former with striations for holding mortar, the latter with flanges for the overlapping tile.

[Some substance resembling Red Ochre was found on the bottom of the Relic-bed. On this Mr. F. W. Rudler, F.G.S., has kindly reported as follows:—

Two pieces of a fine laminated sandy clay, coloured with oxide of iron, forming a peach-blossom coloured ochre, which gives a good streak, and might have been used as a pale reddle. Mr. C. Reid does not know any material like it among the rocks of East Anglia, and suggest that it may have been derived from the Trias.—F. W. RUDLER.]

IRON RELICS.—Some Horse-shoes were found nearer the surface; of these, several belong to small animals the size of a cob; they occur at a high level, but the pattern is mediæval type; a small space is left for the frog; the rim is $1\frac{1}{2}$ inches wide; there are nail holes, but no tips front or back; the bottom



FIG. 16. Fragment of base of vessel from Skitts Hill. One-half size.

is distinctly convex for the tread. This kind of horse-shoe is usually called Roman; but I doubt the correctness of the term; it would be better to call them Saxon, Danish, or Norman, for we know that these people shod their horses by nailing the shoes on.

NOTES BY THE AUTHOR.

The Cause of the Preservation of Some of the Objects.

The condition of the bones at various levels varies much. Those found in the lowest bed are almost perfect, for these sank under the gently-moving water at the margin of a broad lake, and were subsequently enveloped in the lake mud, mixed with vegetable growth and decayed weeds and rushes. Under these conditions the bones obtained the smooth, glossy, and unctuous

state which many still retain. In the drier overlaying beds, the condition of the specimens was different; there the bones were left on the surface of the soil, exposed to atmospheric influences before being finally covered up by the floods, and they are therefore generally very earthy, and, in many cases, completely decayed. In the lowest bed, at the depth of 9 to 10 feet, not only the bones, but leaves, grasses, rushes, acorns, &c., have been saved from decay by the anti-septic action of the peaty matter. The objects, like the material in which they were enveloped, were stained of various hues of green, red, and bluish-black, by the percolation of coloured fluid. Whole spadefull of the earth were noticed to be deeply coloured when first lifted up.

General Conclusions.

One of the first questions which suggests itself in taking a retrospect of the subject is—what could have been the motive which led early man to form lake-settlements and habitations? Light may be thrown upon this by a comparison of the settlement now under notice with those of Switzerland, so fully treated of by Dr. Keller and other Continental writers, and from the summary of their works given by Stevens in *Flint Chips*. Their conclusions are that the motive was the desire of protection and defence, in the first place, against the wild animals, and, secondly, against the aborigines who, it is suggested, might have been fierce enemies of the Lake-dwelling invaders and colonizers.

Taking the evidence of the flints, we come to the conclusion that Neolithic man here, at Braintree, lived in villages, and had their settled habitations within, or very near, the watercourse and sloping ground suitable for cultivation. At the same time, they were herders of tame cattle, as well as hunters in the forests. The river served two purposes to the dwellers—giving a constant water-supply, and a line of defence from predatory man and beast. It is most probable that both sides of the valley were occupied by the same people; and, in fact, on the opposite side of the Pods brook and its slope traces of workings or of habitations have been discovered.

Whether the lake-habitations at Skitts Hill belong to the earliest Neolithic settlers in this locality, or not; or whether there were in the district earlier and ruder men of the Stone-age before the arrival of the lake-dwellers; or whether this

method of construction of habitations was imported from the Continent; these are questions we cannot at present decide. But from the examination of the site and remains at Skitts Hill, we may reasonably conclude that we have here very early habitations, and that in these we have traces of Neolithic man in this district. It has been suggested by some that the greater part of Essex was so much occupied by primæval forest that there was little room left for primitive man, and that, for the most part, the land was occupied by wild animals. Confining our observations to Great Britain, and comparing Essex with the more open plains and moorlands, such as Salisbury Plain, Grims Dyke country, and the Wolds of Yorkshire, it may be that on account of the abundance of timber, Essex was less favourable for the settlement of men of the Stone-age and later times, and, in consequence, they were not so numerous. For men possessing only stone and other primitive tools, forest clearing would be a difficult undertaking, and for that reason, if for no other, the numerous valleys and margins of streams were inhabited before the higher grounds, and, probably, at the earliest arrival of Neolithic man. And here, at Skitts Hill, have been found what we take to have been one of these early settlements, just where we might expect, namely, in proximity to the river and upon the lower grounds. When once the Lake-settlements were formed, they, no doubt, survived throughout long epochs, and may have continued during the Stone, Bronze, and Iron periods. This seems to be a reasonable deduction, and one supported by comparison with like discoveries. And such settlements as that at Skitts Hill may really be numerous, but concealed from observation by alluvial accumulations, which will be removed in the future for the purposes of the brick-making industry. These valley beds are less-frequently disturbed than the pleistocene deposits on higher ground, which are excavated for the sake of loams and gravels. Hence the interest of the Skitts Hill discovery, and the importance of preserving the objects found, as a clue to future discoveries in this branch of local archæology.

All the objects described in this paper are now placed in the possession of the Essex Field Club for exhibition in the County Museum of Natural History, my wish being that they may form an object-lesson to those who, like myself, are seeking on every occasion to find and record any new facts

which may add to the accumulated materials for a better knowledge of ante-historic man in our country.⁴

REMARKS BY F. W. READER.

It may be remembered, by those who were present when Mr. Kenworthy's paper was read at the meeting of the Club, that a considerable discussion was raised as to whether his discoveries related to a *Lake Dwelling*, or to the results of alluvial wash.

As I have since then had the pleasure of assisting Mr. Kenworthy and Mr. Cole in the preparation of the paper for the Club's journal, and have spent a week at Braintree, making the Plan and Sections already given in this paper, and otherwise investigating the matter, it has been suggested that some remarks from me might be of interest.

With regard to Mr. Kenworthy's conclusions, I think that he has, in the main, ample grounds on which to base them; but I also think they should be considered as tentative only. For the present the record should be regarded more as a basis for future observation than as in anyway complete or conclusive.

There are one or two points that should be remembered in considering this subject. In the first place, the excavations are being carried out to obtain brick earth, and not for archæological research. Then it is only quite in the latter stage of his observations that Mr. Kenworthy developed the idea that layer No. II. (see section on p. 98) was an artificial bed; consequently, much that might have been valuable evidence may have been overlooked, such as the splitting, shaping, and position of the stakes. For the same reason, the exact level of many of the apparently less important relics has not been recorded, more particularly the *pottery*. This is unfortunate, as pottery affords one of the best means of evidence of the period of such remains. Further, the black peaty soil of this bed renders objects very difficult of recognition, and in the absence of continuous watching by trained observers, no doubt much has been missed.

I do not intend to make these remarks in a critical spirit, but rather as explanatory. I consider Mr. Kenworthy's patient

⁴ [It is much to be wished that all finders and possessors of objects of the kind would follow Mr. Kenworthy's enlightened policy. In our county alone there are hundreds of specimens in private hands practically useless playthings to their owners and always liable to be lost or mislaid, but which if deposited in one or other of our local museums would be preserved with others of their kind, and would ultimately form most valuable scientific evidence for the use of future workers in like subjects.—ED.]

and prolonged observations worthy of the highest praise, and feel confident that he has drawn attention to a matter that may prove to be of great interest and importance.

There still remains about 200 superficial feet of this deposit in the same meadow awaiting excavation, which operation will probably extend over several years. This is the portion marked on the Plan at page 97 between DE and F. It will be noticed that as the excavation approaches the road it runs away from the river; the portion of the meadow adjoining the river having been purchased so as to prevent these diggings encroaching too nearly on the Braintree Mill premises.

This is a great misfortune for the Lake Dwelling researches. Should the proprietors of the Brick Works ever carry out excavations on the other side of the road, I think that still more might be found, as here the old river bed widens out considerably, and suggests a more favourable spot for such a settlement than the narrow strip represented by the portion already excavated.

The points in favour of this bed being artificial are the curious mixture of which it is composed, which corresponds with similar beds known as "*Packwerk*," met with in the Continental Lake Dwelling sites of "*Fascine*" formation, and that this mixture dies out as the bed approaches the old shore and the present river. I have indicated this by the shading on the Section. That it was constructed and then occupied rather than being a gradual accretion is shewn by the fact that the burnt flints, ashes, and traces of fire occur mostly on the top of this layer. The portion of this layer which is at present exposed (D—E on Plan) was, when I first saw it, covered with ashes and burnt flints, apparently a hearth; but on turning it over, the traces of fire disappeared after a few inches.

The preserved evidence of the pinning of the bed by shaped stakes, exists only in the one specimen (fig. 5); but Mr. Kenworthy remembers to have seen others that had apparently been split and shaped in a similar manner. His idea of the splitting of these stakes is ingenious, but requires, I think, more evidence to confirm it. This is a point that should be carefully watched in the future digging—where and how vertical stakes occur. A *Terramara* formed with vertical inclined stakes, discovered at Castione, is described and illustrated in Munro's *Lake Dwellings*, p. 253, fig. 82, and is interesting by way of comparison.

An endeavour should be made to determine the shape of the foundations of the dwellings—whether these represent a cluster

of detached huts with passages between, or form a continuous platform. It has been noticed that portions of this layer were different from the rest, and the relics found in them were stained a different colour. This might be caused by the accumulation in the passage between the huts, and in such a deposit one would expect to find the most relics.

Concerning the age of this layer, I do not think there is any positive evidence of its construction in Neolithic times, although such may be the case, and its occupation may have been continued through and beyond the Bronze Age, as Mr. Kenworthy suggests. The great majority of the relics might point equally to the Bronze Age or to Neolithic times. The Stone Implements—the knife (fig. 7) and the arrowhead (fig. 8) with its fully developed tangs—are such as were used down into Romano-British times. There is little to guide us in the pottery, as the only pieces which can with certainty be said to have come from this level, are some fragments of the large vessel referred to before, the portion of the base of which is represented (fig. 16). The base is much coarser than the other fragments, but I think this may be due to its having been placed on twigs and straw to dry before firing. The other portions undoubtedly show marks of having been wheel-turned.

There is but one small fragment which can be said to be hand-made and to resemble the pottery of the Stone or Bronze Age, and the exact locality of this has not been recorded. At the same time, some of the ordinary Late Celtic pottery, such as occurs plentifully in the level above (No. III.), is supposed to have come from this level, but as an accurate record has not been kept, this point must be deferred for future investigation.

The fact that no bronze or metal objects have come to light from this bed may perhaps be accounted for by the difficulty of recognising objects in the black peaty soil of which it is composed. It is also to be noted that no metal objects have been found in the higher levels, with the exception of a few horse-shoes near the surface. Evidences of the use of metal tools are, I think, to be found in the cutting of several of the antler-tools and bones; notably in the Red-deer skull (Plate II). The principal cuts are too flat and sharp to warrant one imagining that they were made by a stone implement. The cuts are here figured on a larger scale (fig. 17). The cutting marks on the antler tool (fig. 11) also suggests a metal tool and the longitudinal, tapering boring (see fig. 12) appears to have been done to receive the tang of a metal knife or other tool.

There are also saw-cuts on some of the bones that could scarcely have been made with a stone-saw.

Mr. Read, F.S.A., of the British Museum, tells me that he considers such antler-tools as figs. 9, 10 and 11 to belong to the Bronze Age or later.

It must not be supposed that the Fascine system of Lacustrine Dwellings is older than the Pile system because of its simpler and more primitive method. The results of Continental researches show that both systems are distributed throughout the different ages, but that the Fascine system occurs generally in the shallow, mossy lakes. This no doubt accounts for the prevalence of the Fascine system in the British Isles.

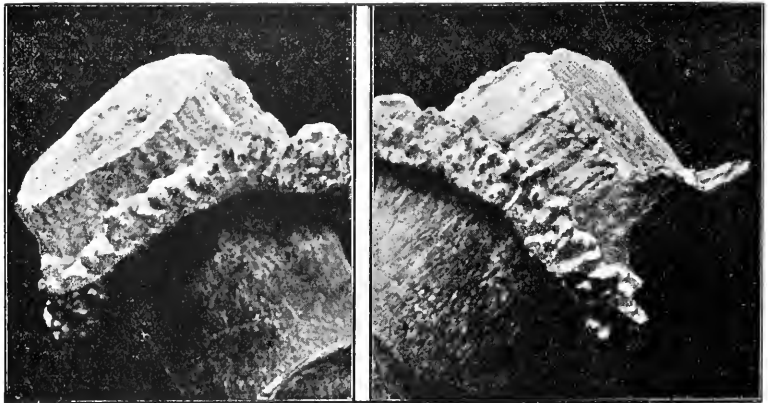


Fig. 17. Photograph of sawn surfaces of Red Deer's Antlers.

Professor Amrein has discovered at Lake Baldegg, a Fascine dwelling constructed on the ruined foundations of a Pile dwelling. See Dr. Keller's *Lake Dwellings*. p 318.

The following note by Messikommer may also be of interest :—

“Man darf mit Bestimmtheit annehmen, dass alle jene Niederlassungen in welchen gespaltenes Eichenholz in grösserer Menge zum Vorschein kommt, auch das Metall in einfacher (Kupfer) oder zusammen-gesetzter Form (Bronze) gekannt haben.”

“In those remains where split oak-wood occurs in any great quantity, one may with certainty conclude that bronze or copper was known.”

However such speculations are at present, of little use, except perhaps, as being suggestive to those who may in the future undertake the investigation of this locality. What is now wanted is more evidence precisely recorded.

Considering the scientific importance of the subject (one that has unfortunately been much neglected in this country), it is to be hoped that Mr. Kenworthy will have every facility afforded him for continuing his observations, and that members of the Club will come forward to render him assistance in the continuous watching of the Relic Bed, when excavations are recommenced.

Owing to an exaggerated article that appeared in a London daily paper, numerous "curiosity hunters" have been induced to visit the spot, and thereby caused annoyance to the proprietors of the Brick works. But it is possible that upon proper representation from the Club, Messrs. Brown will be induced to look favourably upon the researches, and assist them, while discouraging the mere "curiosity hunter," a class which has done so much injury at Stoke Newington, Ilford, Leyton, and other places having a popular reputation as localities for pre-historic relics.

I should also like to appeal to those who own the numerous objects that have been found before Mr. Kenworthy's appearance on the scene, hoping that they may see their way to place these objects in the collection, which is now, through the generosity and public spirit of Mr. Kenworthy, in the Club's Museum, or at least that they will lend them to the Club, in order that a record of them may be made. Mr. Kenworthy or Mr. W. Cole will be very glad to receive any objects forwarded to them for preservation with the other portions of the collection.

**NOTES ON THE GEOLOGY OF THE BRAINTREE DISTRICT,
BEARING UPON THE SECTIONS SEEN THERE ON
MAY 31st, 1899.**

By T. V. HOLMES, F.G.S.

My object in these remarks is to note the features in the geology of the Braintree district, bearing upon the sections shown to Mr. Cole, Mr. Reader, and myself, by the Rev. J. W. Kenworthy, as well as the chief points of interest in the sections themselves. The general geological structure of the country within a radius of six or seven miles around Braintree is very

simple. The lowest formation visible anywhere is the London Clay, which appears here and there in the river-valleys. Above the London Clay, and chiefly in the river-valleys, may be seen the sand and gravel of the Glacial Period. Above this sand and gravel, and forming the surface of the plateau between the valleys, is the Chalky Boulder Clay. Then, here and there on the plateau, are patches of gravel and loam resting upon the Chalky Boulder Clay, and usually occupying slight depressions on its surface. These last-named deposits (which are post-Glacial in the sense of being of later date than the Boulder Clay) are extremely irregular in their occurrence and in the space they occupy. They have sometimes been found to contain mammalian remains of interest, as in the brickyard at Great Yeldham, of which some account is given in the *ESSEX NATURALIST* (vol. ix., pp. 115--118). All the beds hitherto mentioned are widely distributed, for though the lower are seldom visible, except in the river-valleys, they are found over considerable areas of country beneath the higher beds. In addition, there are deposits which are wholly confined to the river-valleys, having been formed by the streams at various periods during the erosion of their valleys. These are all of later date than the others mentioned, the most recent being the alluvium occupying the flat ground close to the streams. No older river deposits, formed when the river had not cut down its channel to the present level, are shown on the Geological Survey Map as manifestly existing within three or four miles of Braintree. For the older the terrace, the longer the time since its formation during which it has been subject to destructive influences, whether those resulting from the meandering of the stream or from the ordinary action of the weather. Then, while fragments of terraces cut in comparatively hard rock often remain clear and distinct, those cut in soft material, like London Clay or Glacial Gravel, soon cease to be traceable; and the difficulty of identifying them is at its highest in narrow valleys like those around Braintree, where any river terrace can never have been more than a few yards in breadth, and where, consequently, its distinctively terrace-like aspect can never have been very conspicuous. However, the obscurity that prevents any beds of this kind from being mapped at Braintree by no means implies that they do not exist there. In the *Geological Survey Memoir on Sheet 17+* (which includes Braintree, Cog-

† *The Geology of the N.W. part of Essex and the N.E. part of Herts., with parts of Cambridgeshire and Suffolk.* By W. Whitaker, W. H. Penning, W. H. Dalton, and F. J. Bennett. London, 1878.

geshall, and Witham towards its south-eastern border), the following remarks occur (p. 65):—

“The Valley loams and gravels are not extensive, and it is probable that some of the deposits that are really more recent have been included in the mapping with the Glacial gravels, which occupy most of the valleys, and from which they cannot readily be separated.”

These preliminary remarks will render those which follow more intelligible. The sections shown us by Mr. Kenworthy

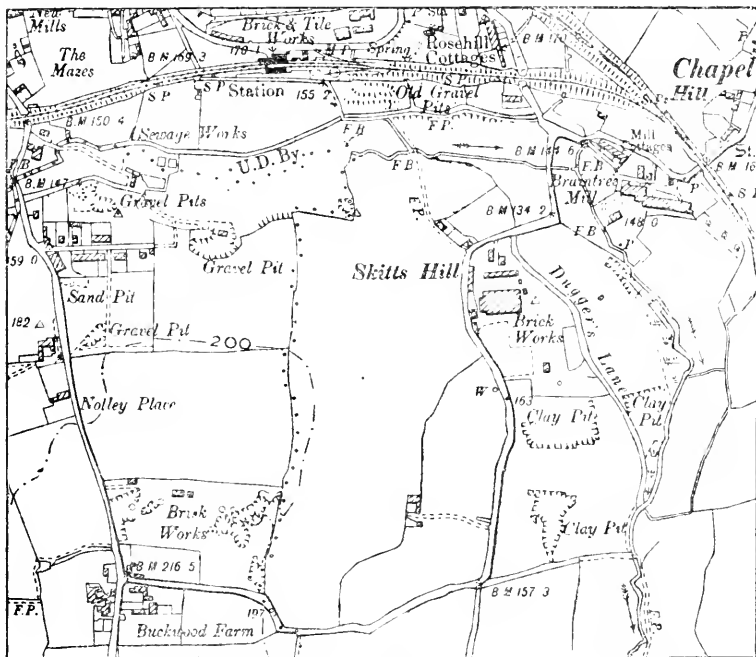


FIG. 18. Portion of 6 inch Ordnance Map of the district around Braintree.

were (with one slight exception) all south of the railway, west of the road from Hoppit Bridge to Buckwood Farm, north of that from Buckwood Farm eastward to the river Brain, and west of the Brain northward to Braintree Mill. On leaving Braintree Railway Station, we crossed the railway a few yards east of it, and looked at the “Old Gravel Pits,” shown on the Ordnance Map (Fig. 18), a few yards south-east of the station, and between the railway and the mill stream. The contour of the ground around these pits to some extent suggested the view that they were in old river gravel, rather than

gravel of Glacial age, though there was not evidence enough to have warranted their separation from the latter on the Geological Map. Crossing the Mill stream and the alluvial flat of the Brain southward of it, we then inspected the "Gravel Pit" on the southern slope of the valley, nearly due south of Braintree Railway Station. From this pit we passed to the others south-west of it, where "Sand Pit" and "Gravel Pit" appear on the map, east of the road from Hoppit Bridge to Black Notley. The material in all these pits appeared to be of Glacial age; but in the "Brick Works," in the angle between the Black Notley road and that ranging eastward from Buckwood Farm, there was a patch of loam overlying the Glacial deposits, the junction being shown as in the section here given; height, about 8 feet. Fig. 19.

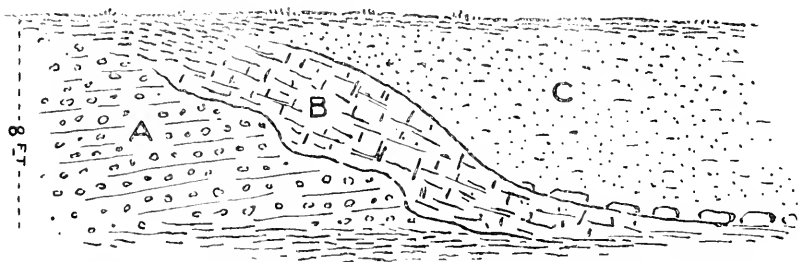


FIG. 19 Section in Pit in Brickworks near Braintree. A, Glacial Gravel; B, Boulder Clay; C, Post-Glacial Loam.

Patches of Post-Glacial loam are shown here and there, in the neighbourhood of Braintree, on the Geological Map, but none appears to have been known at the above spot when the map was published; it is probably to be found at many places where it is not yet mapped, for there is usually no surface indication to suggest its presence, and its existence becomes known through its accidental discovery in a gravel or brick pit. The above section was clear only to the extent shown. The thin strip of Boulder Clay (B) was decalcified, but there can be no doubt as to its real nature. Some large stones were seen on the line of junction between the Boulder Clay and the loam. I have already mentioned the discovery of Mammalian remains in post-Glacial loam at Great Yeldham.

From Buckwood Farm we proceeded along the road ranging thence in an easterly direction, and entered the field south of

the Skitts Hill Brick Works, in which the words "Clay Pit" appear twice. In this field the nature of the material, the shape of the ground, and the appearance of London Clay at intervals along the slope, suggested that its surface was mainly occupied by terraces of old river deposits. Then, crossing Duggers' Lane, we came to the excavations in the alluvium—the most recent of the river-deposits. To a distance of some twenty or thirty yards from the river Brain the alluvium on its western bank had been carted away to a depth of 6 or 7 feet, the original surface of the flat being shown by its level on the eastern bank of the stream. The alluvial flat of the Brain hereabouts is of no great breadth, and there are no signs of the former existence of a lake; but primitive "Moated Granges" may often have been constructed on an alluvial marsh with the aid of piles, and by the formation of an additional short channel, which would allow the habitations to be surrounded by water.

Of Mr. Kenworthy's discoveries in this alluvial flat there is no need to say anything here. It may, however, be useful to add, for the sake of comparison, the following brief account of some excavations in the alluvium of the river Cam, between Audley End and Saffron Walden, quoted in the *Geological Survey Memoir on Sheet 47* (pp. 72--73). The original account was given by the late G. E. Roberts, in the *Anthropological Review*, vol. ii., pp. 41--43 (1864).

"In the course of railway works between Audley End and Saffron Walden, it became necessary to divert the course of the river Cam into a part of the meadow land bounding the stream, which was traditionally known as 'the old river bed.' A cutting, about 20 feet deep, through this, necessitated for the foundation of a wide and large culvert to give passage to the river through the railway embankment, disclosed the following section:—

Soil	.. .. .	1 foot.
Alluvium	{ Clay	3 feet.
	{ Peat. Bones at the bottom	12 ..
Gravel	.. .. .

Near the bottom of this "peat," and at a depth from the surface of 16 ft., an astonishing quantity of Mammalian bones were found. . . . Out of the excavation—an area of not more than 20 ft. by 60 ft. —two cartloads of "large bones" were taken away,

The peat is, more properly, a blackish clay, with numerous fragments of wood and a few logs of considerable size bedded in it. It is everywhere full of fluviatile shells, of species common in the district, and contains many naturally-formed chips and flakes of flint and a few rolled pebbles.

The bones, which bear artificially-made markings,* are the lower jaws of a small ox, probably *Bos longifrons*.

A single tooth of badger (?) was found at the same level in the cutting.

A remarkably fine horn of the great elk, *Cervus megaceros*, was also found in association with these bones."

And, as sections in alluvium are rare, it may be well to add, from the same Memoir, p. 73 :—

"Mr. Dalton notes that where the Rivenhall Brook passes under the railway N.E. of Witham the alluvium consists in part of alternate beds of peat and calcareous tufa, full of shells; and that similar tufaceous deposits occur in the neighbourhood at swampy spots on the shell-marl and on Boulder Clay."

Geological Sections in soft sands, gravels, and clays, like those which cover almost the whole of Essex, are liable to become almost valueless in the course of a few months, or even weeks. We may well, therefore, congratulate ourselves on the presence at Braintree of so keen and constant an observer as Mr. Kenworthy.

NOTE.

My omission to mention the "Westleton Beds" as existing in the neighbourhood of Braintree may, perhaps, be noticed. My object has been simply to avoid confusion. The beds already touched upon comprise all those manifestly existing in the district. It is possible that, had we much more geological evidence than is at present available, we might class some of the sand and gravel, now mapped as Glacial, with the somewhat older Westleton Beds. But looking at the great variability, in this and other parts of Essex, of what has always been classed as Glacial gravel, it appears to me that the evidence now existing would not warrant any division between Glacial gravel and Westleton Beds about Braintree, as a matter of evident fact, even if we concede the probable truth of Sir Joseph Prestwich's general view.

Those interested in the Westleton Beds and their distribution are referred to Sir Joseph Prestwich's paper on the subject, *Quart. Journ. Geol. Soc.*, vol. lxvi., pp. 84--181 (1890). A short review of the above paper by the present writer appears in the *ESSEX NATURALIST*, vol. iv., p. 100 (1890).

* * Made by implements of flint."

THE OCCURRENCE IN ESSEX OF A SPECIES
OF WOODLOUSE (ISOPODA) NEW TO
BRITAIN (*PORCELLIO RATZBURGI*, BRANDT.)

By WILFRED MARK WEBB, F.L.S.

[Read December 16th, 1899.]

HAVING dealt in the *ESSEX NATURALIST* with the Land and Freshwater Shells of the county in some detail, there seemed to be no likelihood of my making any contribution of importance to the Club upon that subject for some time to come. I, therefore, at our worthy Secretary's request, turned my attention to the collection of Centipedes and Millipedes, classes in which I had already taken a considerable amount of interest. At the same time it was by no means difficult to secure land Isopods, and it seemed as if the study of our Essex Woodlice might produce an addition to our knowledge of the county fauna, with less labour, owing to the smaller number of species.

Being doubtful of some of my determinations, I submitted a number of Isopods to the Rev. Canon Norman, M.A., F.R.S., who had kindly offered me his assistance. The result was that a specimen of *Porcellio* was considered by that authority to be *Porcellio ratzburgi*, Brandt, but its antennæ being damaged it could not be absolutely determined. Other examples from another locality were too young to make quite sure of, but the species is one, said Canon Norman, that there is reason to think might be found in England. Subsequently I have been through my material from Warley and Brightlingsea, and have picked out two additional specimens from the former locality, after careful examination of the supposed *Porcellio ratzburgi*. Canon Norman now tells me that they belong to that species, which has not hitherto been recorded from this country, and I had the pleasure of exhibiting the two woodlice at the meeting of the Club at the Geological Museum, on December 16th. The locality is Warley, and possibly also the species occurs at Brightlingsea, though only immature examples, if any, are in my collection from the latter place. It has been found in Norway, Germany, and France.

[Owing to the interest of this observation of Mr. Webb's, it seems desirable to publish his note here, somewhat in advance of order of date.—ED.]

THE ESSEX FIELD CLUB.

GARDEN PARTY AT "KNIGHTON."

SATURDAY, APRIL 22ND, 1899.

THE Summer Session of the Club began with a very enjoyable Garden Party, kindly given by Mr. and Mrs. E. N. Buxton at their beautiful grounds, "Knighton," Buckhurst Hill. A large body of members was met at the Station by the Secretary, and conducted through Lords' Bushes to the private gate at the north side of the grounds. Many came from other parts, and in all about 70 members and visitors accepted our kind hosts' invitation. The members were met on the lawn by Mr. and Mrs. Buxton. One of the most charming sights in the spring in the grounds is the fine collection of Daffodils, for which "Knighton" is almost as celebrated as for the Rhododendrons later in the year. The great merit of the garden is that it is truly a "garden wild," intermixed with woodland, and a perfect paradise for birds. No shooting or trapping is allowed, and the numerous "nesting-boxes" placed in quiet corners testified to the care taken in protecting and encouraging the dwellers in the woods and thickets.

The afternoon was spent in conversation, in the delights of croquet, boating on the pretty lake, fringed with all kinds of aquatic plants, or in examining Mr. Buxton's magnificent collection of the heads of large game, and antlers of the Cervidæ, with which the central hall of the mansion is ornamented. They are all trophies of Mr. Buxton's skill as a hunter, during his sporting tours in various parts of Europe. His two volumes, "Short Stalks," and "More Short Stalks," give the history of many of these fine specimens, which are not only of interest to the naturalist, but are in themselves admirable examples of the taxidermist's art.

Afternoon tea and other refreshments were served in the hall and dining room.

During the afternoon an ORDINARY MEETING of the Club (the 187th) was held in the Drawing Room, Mr. D. Howard, President, in the chair.

On the motion of the President, a very hearty vote of thanks was passed to Mr. and Mrs. Buxton for their hospitable kindness in arranging the meeting.

The following were elected Members of the Club:—Mr. Harry Bird, C.C., Miss Amy M. Horton, Mr. Russell Paterson, and Mr. G. T. Reid.

Dr. H. C. Sorby, F.R.S., exhibited a series of specimens showing the advances he had recently made in the methods of preparing Marine Animals for Museum exhibition. The Doctor made some remarks on these methods. He had found that menthol was an excellent agent for "fixing" and killing many organisms in life-like positions, and he had recently employed dense glycerine as a permanent preservative. We hope to be enabled to publish details in the *ESSEX NATURALIST* at an early date.

To quote the words of the *County Chronicle*:—"Fortunately April was kind, and, in spite of a somewhat threatening dulness during the early part of the afternoon, the sun came out of his hiding-place about four o'clock, and shone with a genial warmth until the party broke up, each member returning home with a sense of gratitude to the host and hostess for having shown them in so hospitable a manner one of the most charming spots in Essex."

WOODLAND RAMBLE AND VISIT TO YARDLEY
HILL, EPPING FOREST.

SATURDAY, JUNE 10TH, 1899.

This meeting represented our usual Spring Forest Ramble, the late unseasonable and inclement weather having led to its postponement.

The party met at Loughton Station about 3 o'clock, and walked across the Forest by Strawberry (? Starberry) Hill ponds, High Beach, and Hill Wood (near which the site of Fairmead Lodge, recently demolished, was pointed out (see vol. x., p. 296, and *ante* p. 56). On the way, the refreshing "leafiness" of the forest trees was much commented upon. The cold weather in May appeared to have been very unfavourable to the larvæ of *Cheimatobia* and *Hybernia*, of which there were few this spring—a great contrast with some recent years, in which they were so numerous and their ravages so enormous that many trees were almost stripped bare by the beginning of June. It was evident that this year all the trees would make wood abundantly. Meanwhile the forest was looking its loveliest; all the greens were bright and fresh.

Crossing part of the "mead," the road up Leppits Hill was taken, and a little beyond the "Owl" (well-known to London entomologists) the party turned into a most pleasant sloping meadow, crowded with flowers, amongst which the great quantity of the pretty Umbellifer, the Burnet Saxifrage (*Pimpinella saxifraga*), specially attracted attention. The footpath running along the edge of the ridge afforded capital views, extending to St. Paul's Cathedral, and—in clear days—to the Crystal Palace. The latter was not visible on the day of the meeting, and St. Paul's shone out only for a short time, because, although the day was fine and delightful for a country ramble, there was a haze in the distance. A pleasant walk by Gillwell Farm, through Gillwell Lane, led to Yardley Hill, a timbered ridge which projects into the Lea Valley. It is the latest gift of our Vice-President, Mr. E. N. Buxton, J.P., Verderer, and was formally dedicated as part of the Forest by the Duke of Connaught, Ranger, on June 1st, and details of this splendid addition are given in another article in the present part (*ante* p. 78).

Tea was served in a tent erected on the summit of a hill, by kind permission of Mr. F. F. McKenzie, the Superintendent of the Forest, allowing of most varied and extended views over the wide Lea Valley and the surrounding woodlands. The spot was that on which the ceremony of dedication of the hill was performed on the 1st of June.

After tea the President, Mr. Howard, said that absence from England prevented Mr. Buxton from being present with them that day. They had had a good opportunity of appreciating the beauty and value of Mr. Buxton's most welcome addition to the Forest, and he proposed that the Club should pass a very hearty vote of thanks to Mr. Buxton for his generosity and public spirit, so often shown for the welfare of the Forest. This vote was passed by acclamation.

Mr. Cole called attention to the special Report on Queen Elizabeth's Lodge, and the Club's Museum there, which had been recently presented to the Court of Common Council of the City of London by the Epping Forest

Committee, and which report had been unanimously agreed to, and ordered to be acted upon. The Lodge would be thoroughly restored, and much greater space given to the Museum. (See Abstract of the Report, *ante* pp. 31-34.)

On the slope of the hill, overlooking the Lea Valley, Mr. T. V. Holmes, F.G.S., gave a short lecture on the physical geography of this fine broad expanse of alluvial soil.¹

A ramble through Bury Wood and over Chingford Plain took the party to Queen Elizabeth's Lodge, where the Epping Forest Museum was inspected with interest.

THIRD VOYAGE ON THE LEA FROM HERTFORD TO WALTHAM ABBEY.

THURSDAY, JUNE 15TH, 1899.

Conductors :—Major Lamorock Flower, F. San. 1.; Mark Davies, Esq. (Gresham Angling Society); T. V. Holmes, Esq., F.G.S.; W. M. Webb, Esq., F.L.S., and the Hon. Secretaries

By the continued courtesy of the Lee Conservancy Board and the abundant kindness of our Member, Major Flower, the Club was enabled, under exceptionally favourable circumstances, to repeat the charming water excursion which had been found so enjoyable on two previous occasions.² The arrangements were similar: the greater number of voyagers went down to Hertford by the 9.30 train from London; others went overnight or cycled down, and a break started in good time from Buckhurst Hill to meet an early train from Waltham Cross, for the convenience of the Forest-dwelling members, and to carry the materials for the tea on board.

After a brief inspection of the ancient town, and the Castle, mentioned in a former report, the party embarked on board the "Salisbury" from the towing path near the road from the railway station, steam was turned on, and the voyage began.

Major Flower is one of the best authorities on the Lea, and was an enthusiastic describer of its usefulness and the quiet pastoral beauties of the bordering water-meadows. Mr. Corble, the Clerk to the Lee Conservancy Board, with thoughtful kindness, sent an ample supply of reprinted copies of a paper by Mr. E. A. H. Bramley, entitled "Walton's Favourite River," which had been read before the Gresham Angling Society on July 19th, 1898, for distribution amongst the members of the party. This little book pleasantly gave much information to strangers to the Lea, and as the present compiler has somewhat fully described the river in the reports already published, he will gladly quote some passages. Mr. Bramley is picturing a voyage similar to our own, and begins:—

¹ See his Paper on "The Geology of the Lea Valley," *ESSEX NATURALIST*, vol. viii., 198.

² The previous voyages on the Lea under Major Flower's superintendence were held on July 14th, 1894 ("Down River Lea from Hertford to Tottenham," *ESSEX NATURALIST*, vol. viii., pp. 205-213); on July 29th, 1895 ("Voyage from Bromley to Waltham Abbey," *ESSEX NATURALIST*, vol. ix., pp. 87-99); June 27th, 1896 ("Second Voyage from Hertford to Waltham Abbey," *ESSEX NATURALIST*, vol. ix., pp. 208-211).

"We arrive by train at the neat little town of Hertford. Before commencing our voyage from this, the beginning of the navigable part of the river, we take an object-lesson from our host, who is guide, philosopher, and friend. We take an imaginary stand in a balloon, and gaze down on a watershed, whence the congealed dews of heaven are drained over an area of 600 square miles. The watershed may be likened to a crooked trough, the bottom of which is the River Lea, stretching sinuously for about 70 miles, and drawing water from the tributaries and slopes on either side, and the tilt of which, from source to mouth, is about 400 feet. Our bird's-eye view stretches into four counties—those of Bedford, Hertford, Essex, and Middlesex. For navigable purposes Hertford is the dividing line, the part from the source to Hertford being usually described as the Upper Lea, and from Hertford to the Thames as the Lower Lea. On the upper part we see a few pleasure boats; on the lower part, numerous barges bearing timber, gunpowder (from the works round and about Enfield), malt from Hertford, Ware, Hoddesdon, &c. The navigation is much busier than the uninitiated imagine. The traffic down the Lea does not merely touch the Thames; there is a junction of the Regent's Canal at the lower part, along which barges travel, and thence along the Grand Junction Canal to Birmingham.

"We gaze down on this picture map, and see a dozen tributary streams lacing and braiding the slopes, pouring their liquid wealth into the Lea, appearing like so many ribs joining the spine. But only three of these are visible in the first 40 miles, and they are just above Hertford, so that the river is comparatively narrow in its upper part. We notice a silver-like sheen in the side streams down as far as Hoddesdon, then a little yellow tinge in a few tributaries, towards the lower reaches a more sombre hue. Why is this? Simply because the bed of the upper stream (with the beds of tributaries) and part of the lower stream, is of chalk. The Ash, which joins the left bank near Hoddesdon, has a soil of gravel and chalk; and some of the lower tributaries come over clay and even mud. Fielde's Weir is taken as the dividing line for geological purposes. There the unadulterated chalk ends; and the purity of the water, and essentially the higher quality of the fish, commence to change. This accounts for the dingy and gloomy shade of the Lea, which has fallen into bad company, as it enters London proper.

"The Lea rises in the form of a spring at Leagrave (formerly Leagrove), a grove in which the river is born. This is in Bedfordshire, about three miles north-west of the town now designated Luton, which takes its name from the river. It was once known as Luyton; the letter "y" has since dropped out, and the name remains as Luton, meaning the town on the Luy. The stream travels nearly to Hertford, about 40 miles, with no accession of consequence other than soakage from the banks. After passing Hatfield, and almost reaching Hertford, it is joined by Bayford Brook on the right bank, and two pretty trout streams (the Mimram and the Beane) on the left. And here we bid adieu to the Upper Lea.

"Heave O! 'The anchor's weighed,' We are nearly 30 miles (by water) from London; our homely barge steams gently on, and we pass Dicker Mill, in sight of some richly-clothed heights, on the left bank, known as Port Hill. History lends enchantment to the place, for here Alfred the Great is said to have fought his last battle with the Danes; and our host produces for our gratification a time-worn, corroded, double-edged sword, with an equally quaint dagger, which had been dredged from the river bed at this part, the

belief being that they were weapons of warfare used in the struggles between Saxon and Dane a thousand years ago. We have passed a lock and two bridges, and gazed joyously on the gambolling roach and dace in the transparent stream, when we reach the Balance-engine, which plays an important part in contributing to the comfort of two-fifths of the population of London. On the right bank we see the birthplace of the New River (at Chadwell Springs), or New River Head, and lower down the Amwell Springs, the channel of which river was dug and fashioned in the reign of James I. to supply the inhabitants of North London with water. For garden-like banks, and purity of water, along a course of about 17 miles' crowfly—and over 40 miles in its windings—this New River is unsurpassed.

“ We are now approaching the town of Ware, and rejoining the river. On the left bank is a mansion, which was formerly a priory established by Benedictine monks; there is also the Priory Mill. Across the old river, where we rejoin it at the end of the cut, the owner of the grounds keeps a bar of wood across the stream as an assertion of private rights against intrusion; but the Conservators, on the occasion of their annual survey, remove this bar, and proceed up the stream as an act of asserted sovereignty, which fact is annually recorded as evidence to be used in case of future litigation.

“ And now we come to Ware itself—the old-fashioned town of maltkilns, and all that pertains to the baking of grain and the manufacture of the staple drink of Old England. Along the left bank we have a number of demesnes, each of which has a summer-house overhanging the river. The town occupies both banks, and has a cosy-looking bridge, which constitutes part of the High Street, leading towards Cambridge. Formerly this was the premier town for malting; it is now put in the background by Wakefield and Burton. Prior to the abolition of the malt tax, there were 150 excisemen constantly engaged in the town; but that was when the malt had to be taxed before being brewed, which secured that beer should be made of malt. Now that the tax is imposed on the hogsheads of beer produced, the constituents of the beer are—well, let us draw the veil, and view the town in other respects! The former name of the town was *Guare*, meaning a weare or dam, which was constructed on the river, and strongly fortified by the Danes in 894, as a means of protecting their vessels. The wily Alfred is said to have drained the bed of the Lea near this place, thereby stranding the vessels and enabling him to destroy the fort. The fish are sporting freely at this place, unconcerned about Roman roads, Danes and Saxons, malting, or history; nor are they much startled at the approach of even the Conservancy barge.

“ We pass the wharf and crane below Ware Bridge, and come to the Tumbling Bay, where fish are abundant, and whence (or thereabouts) commences a stretch of about two miles (more or less) of fishery, rented by the Amwell Magna Angling Association (who have a handsome clubhouse on the river bank), a veritable dreamland for anglers, the smiling woods on the adjacent heights giving a tone to the scene which gladdens the heart of every man who casts a line.³ Hard by, the River Ash, close to the road which runs to Buntingford, empties its tolerably clear waters into the River Lea. Here we come upon the pretty village of Amwell, which derives its name from Emma's Well. Amwell Springs yield an extra supply to the New River, as before stated.

³ Some notable anglers' feats by members of this Association are given in the “Notes” column of the present part of the *ESSEX NATURALIST*.

“Scott (a local Quaker poet) is a name of pious memory. Here is a quotation from one of his poems:—

‘Amwell! perpetual be thy stream,
Nor ere thy streams be less;
Thousands who drink thee never dream
Whence flows the boon they bless.’

“Shortly afterwards we come to the smiling village of Stanstead, its banks decorated by pollard willows. The scene reminds us of many that are peculiar to Dutch villages.”

Thus far Mr. Bramley. We saw all that he describes, and our day was an ideal one. The sun shone brightly, the air was clear, and the trees probably at their absolute best in this wonderful summer for foliage; birds were numerous, the river was full of fish, which the angling members coveted in vain— for it was the last day of the close season. On the banks bloomed an abundance of wild flowers. These were gathered and examined by the botanical members (including Mr. Arthur Sewell and Mr. Money-Kent). Nothing that was new to the Lea list was observed—the most notable find was the “Gold-of-Pleasure” (*Camelina sativa*), which occurred on a piece of waste ground on the banks. Of Mr. W. M. Webb’s gatherings of Mollusca much the same remark applies—nearly all the species previously noted were found, but no novelties.

Mr. Mark Davies, an experienced Lea angler, very kindly gave us the benefit of some remarks on the Lea from a fisherman’s point of view. The following notes embody the gist of his observations:—

SOME RANDOM NOTES BY AN OLD ANGLER ON FISHES OF THE LEA.

By MARK DAVIES, *Member of the Gresham Angling Society.*

“In venturing to discourse to the members of the Essex Field Club on the Fishes of the Lea, I cannot but feel there is some presumption on my part, as I am only able to speak as an old London Angler.

The Lea contains almost every fish that is found in the rivers of England.

Trout are numerous in the upper waters, but below Hertford such as are met with, like Thames trout, grow to a large size. Some thirty years ago I saw one that was caught at Carthagen Weir. It must have weighed nearly ten pounds; it was in beautiful condition, but most unlike the true *Salmo fario*, having no visible spots, and resembled a salmon in appearance. I described this fish to my dear old friend, Dr. John Brunton, who told me that he had once seen a similar fish from the Lea. It was his opinion that they were distinct from ordinary trout—he called them “landlocked salmon.” It has been stated by Prof. Rasch, of the Christiania University, in a pamphlet he wrote in 1857, “that salmon grow, thrive and breed without ever visiting the sea.”

The trout, no doubt, greatly alters in size and appearance according to the condition of water and food; this is well illustrated by the manner in which the New Zealand trout have grown into the size they have in a few years.

The Pike. A Lea Pike is a beautiful fish, and there are no handsomer anywhere—excepting the pike from the Avon, although there may be many much larger. The Gresham Angling Society have in their museum a very fine pike that was taken a few years ago at Dobbs Weir—it weighed 26 $\frac{3}{4}$ lbs. This is considered a large fish for the Lea.

Walton says that Sir Francis Bacon observed the pike to be the longest lived of any fresh-water fish, and it is perhaps the most ferocious inhabitant of our rivers. It has a cruel look, reminding one of the shark. When fishing the reservoir at Chestnut a friend of mine hooked a pike and had almost secured it, when another enormous pike seized the first fish and made off with it into the weeds, and in spite of the angler's efforts the line eventually broke. My friend some days after got the fish he first hooked, in a very swollen state with some of the tackle still in it.

Perch. My first Perch was taken when I was quite a young boy at the Lock by King's Weir; it weighed nearly one pound, and I can vividly re-call the pride and pleasure had in the capture. I am here reminded of the many happy days of my youth spent at Broxbourne. The fishing inn, the "Crown," was then kept by old Tom Want and his brother. An old writer on Fishing, F. March (my copy is dated 1842), says of the "Crown":—"I cannot pass this house without calling and giving the old toast, 'May you never know *want* but by name'—but here there are two Wants, and the more you know of them the better you like them." The house was in those days what Walton called "an honest ale-house, where the sheets smelled of lavender," and the gardens were charming, although not quite so grand as Benningfield afterwards made them.

The Chub. Sometimes called by Lea anglers "Large-headed Dace"—certainly when young the resemblance is somewhat close. My father was quite an adept in catching this fish in the style so delightfully described in the *Complete Angler*. The sedgy banks of the Lea, with the overhanging old pollard willows and deep holes under the banks, are well adapted to this kind of fishing.

The *Dace* of the Lea is a fine lively looking fish, and is taken up to a pound in weight. Twelve to fourteen ounces are very good fish. Those in the neighbourhood of Hertford, and taken with an artificial fly, afford excellent sport, and require a keen sight and quick hand in securing them.

The Roach. "Oh! he is only a roach-fisher" is often used as a term of depreciation. But in reality among many ardent anglers the sport is looked upon next to trout fishing, and certainly among the London fraternity it is thought so much of that during the whole of the season they follow no other—preferring it to every other kind of fishing. In one part of the water at Rye House are still found Roach with black spots. Salter mentions them, and Wheldon says: "At Black Pool, Roach are still taken with black transparent spots upon them; at the bottom of the hole there is a black peaty bog—the spots may arise from this." The extraordinary fact is that although there are other parts of the water of greater depth, the spotted fish are only caught in this hole.

The *Carf* is sometimes taken in the Lea. Possibly being a native of still waters, they are carried by floods or the breaking down of sluices (as are Tench and Rudd) into the river; they then grow finer and fatter, but, it is said, they do not breed.

To the *Tench* much the same remarks apply, but there is a better chance of catching Tench than Carp, as the former are not equally cunning.

Barbel. This fish grows to a large size in the Lea. I have seen great numbers of them below Kings Weir and at Sewardstone some years ago, but they are seldom taken by anglers. Bayley, the proprietor of the waters at the latter place, told me that the celebrated Bayley of Nottingham came to see what he could do there, but he had no success with the Barbel.

The *Gudgeon* was a great favourite with London anglers. It is a bold fish, and greatly esteemed for the table. At one time they were very numerous in some parts of the Lea. Bets have been made to take sixty gudgeon in an hour, a feat often accomplished.

The *Bleak* (called by Walton "the fresh-water sprat") is abundant in the Lea. Like Roach and Dace they are gregarious, swimming in shoals, and taking flies on the surface.

The *Loach*, *Stickleback* and *Minnow* are met with in great quantities.

The *Bream* and the *Ruff* (or Pope) are not uncommon in the Lea.

The *Eel* occurs in good numbers, and of splendid quality for the table.

Stone Loach very plentiful, and *Bullhead* not uncommon.

The *Grayling*. Attempts have been made to introduce this fish into the Lea. I have read that in the summer of 1864 as many as 1,500 Grayling were turned into the river at Brayfordbury Park, but the fish has not been much reported since as having been hooked by any of the Lea Anglers."

A cordial vote of thanks was passed to Mr. Davies, both for his paper and for the information imparted during the excursion.

We now pass the smiling village of Stanstead, with the banks decorated by pollard willows, the neighbouring gardens being very Dutch-like and quaint. Before reaching Rye House, the appointed mid-day resting place, one member, Mr. Benjamin Winstone, who is on board, afforded the party an opportunity of acquiring some information on the history and construction of that historic building. Mr. Cole read for him some extracts from a paper prepared for a visit of the Leland Society some years ago, but which was not read on that occasion for want of time. The paper was entitled:—

RYE HOUSE, 1685.

By BENJAMIN WINSTONE, M.D., F.C.S., &c.

"Rye House is well known as a place of entertainment for school children and others, who resort to it for recreation in large numbers during the summer. It has, in addition to its pleasure grounds, a fine Tudor Gatehouse, the remains of the ancient Manor House; and it possesses moreover an historical interest from its association with the well-known plot, to which it gave the name; a conspiracy having for its object the assassination of Charles the Second and his brother the Duke of York on their return from Newmarket; as the commencement of a general rebellion throughout the kingdom."

After some general observations on the historical authenticity of the conspiracy, and quoting opinions from various authors, Mr. Winstone proceeds:—

"The plot to revolutionize the kingdom, which was to have had its commencement in the assassination of the king and his brother entirely failed.

It has, however, given to the Rye House an historical interest, greatly increased by the arrangement of the grounds at the present time. For although the old buildings, with the exception of the Gate-house, no longer remain, new buildings have been erected, occupying, to a great extent, the sites of the old ones; so that the general appearance now is much the same as is shown in the plan of 1685. The buildings were, at that time, described as being very old, and as they were built at the end of the reign of Henry VII., or beginning of that of Henry VIII., they had been standing more than 160 years, and no doubt had the appearance of being very old, when the account of the plot was drawn up. It is stated by Sir Henry Chauncy, in his History of Hertfordshire, that Henry VI. granted a licence to Andrew Ogard and others, permitting them to impark the site of the Manor of Rye, otherwise called the Isle of Rye, in Stanstead Abbots, and to erect a castle there with lime and stone, and to make battlements and loopholes. The time intervening between the grant to Andrew Ogard, and the reign of Henry VII., comprised the period of the wars of the Houses of York and Lancaster, in which landed proprietors were much involved. It is therefore not unlikely that no opportunity arose for erecting a castle, such as the grant permitted, and that, as the county at the end of the reign of Henry VII. had become so much settled, there was no necessity for erecting a stronger building than that shown in the plan (1685). The gateway, unlike so many other buildings of the same period, is in a good state of repair. In one corner of the room over it is a staircase, shown in the plan as leading to the inner court-yard, but the lower portion has been altered within the last few years. It passes by a vault, reported to have been the dungeon; and bones are shown, said to have been found in it. There arises a doubt whether the manor had any jurisdiction for which a dungeon would be required. The age was, however, very lawless, and for many generations after life was held to be of little value; so that there is a probability of some obnoxious persons having been secretly murdered and buried in the vault. The informer Keeling's companions had designed for him such a fate. The circumstances are mentioned in the account of the 'horrid conspiracy' as follows:—

'John Keeling, one of the conspirators, who, with his brother had given information to Mr. Secretary Jenkins, having let fall some expressions, which, being rumoured about, came quickly to the knowledge of some of the conspirators. Upon this they immediately assembled, and Rumbald declared his fears of Keeling's treachery, and that were he sure of it, he would instantly knock him on the head. Keeling, however, for a time, allayed their suspicion. But the distrust continuing, it was mentioned to Keeling, and he was advised to withdraw for a time out of town, Rumbald offering his house to retire to.'

"Keeling, however, declined the invitation, giving as a reason for doing so, urgent business and family affairs, so that—it is stated

'For that time he got safe out of their hands, which they afterwards extremely regretted; some of them owning, that it was their purpose, if they could have got him abroad, to have killed and privately buried him.'

4 Over the archway are figures, representing on one side two birds, and on the other a dragon about to take hold of a man's hand; on the same side are two supporters holding something, which is much weathered, so that the design cannot very well be made out.

“ Behind the gatehouse are large reception rooms, occupying the same position as the old buildings, and probably erected for the most part on the old foundations. The moat, formerly surrounding the manor house and garden, now also surrounds the garden and buildings. It is, however, narrowed to a ditch in front of the gatehouse; and a little bridge spans it, where once, no doubt, there was a drawbridge, for at the top of the gateway on both sides are holes, as if for the chains by which the drawbridge could be drawn up when safety required. The outer court-yard, separated from the dwelling house and garden by the moat (in which the horsemen and other armed men were to have assembled, and been concealed to await the approach of the royal party), exists as a bowling green, and is bounded on one side by a long low building, occupying the place of the malt house. The granary, the loop-holed wall, and the towers at the corner of the moat have been removed. The grant to Andrew Ogard comprised 50 acres of land—eleven acres of meadow, eight acres of pasture, sixteen acres of wood; which are now no doubt the fields surrounding the premises. The boundaries are not marked in the plan, but a toll gate is mentioned 250 paces from the outer court-yard fence, and apparently occupying the same position as the gate which now separates the premises from the meadows. In the account of Rye House (1685), it is stated, in coming from Newmarket towards London, ‘when you are near the House,’ you pass the meadows over a narrow causeway, at the end of which is a toll gate, which having entered you go through a yard, and a little field. A traveller from Newmarket by Stanstead to Hoddesdon, passes now as he did in the time of Charles II., over the narrow causeway through the meadow, and has to pay toll at the gate. Then he passes through the yard, and through the little field, and enters the narrow lane in which the cart was to have been overturned.

“ Old halls of much more architectural importance, and of an earlier date are known. Netherhall was an earlier and a nobler building than Rye House. Most of them, however, are in ruins, consisting only of detached portions of the walls and the plans of the buildings can only be made out by tracing, where they exist, the foundations of the other portions. But Rye House has the original arrangement of the buildings and premises so well maintained, that there is no difficulty in following the plan of the premises in 1685, and also the plan of the conspirators. It has, therefore, much to render it an object of great interest to all those who derive pleasure from an examination of places and localities which have been rendered important by their historical associations.”

Mr. Winstone exhibited copies of the Plan of 1685, which he had re-printed. A vote of thanks was heartily given to him for the interesting paper read.

Soon afterwards the “Salisbury” was safely moored at the Rye House, and the party sat down to an excellent luncheon provided by Mr. Teal.

Then followed an ORDINARY MEETING (the 188th), Mr. T. V. Holmes, F.G.S., *Vice-President*, in the chair.

The following were elected members of the Club:—Dr. Alexander Ambrose, B.A., M.D., L.L.D., Mrs. A. Boake, Col. Bryan, C.E., Rev. T.

Huddle, M.A., Mrs. A. Johnson, Miss M. M. Johnson, Mr. D. J. Morgan, J.P., Mr. W. S. Parker, Miss Emily Rea, Dr. Albert Wilson, and Miss Berta Wilson.

In the absence of the author, the Secretary read the title and gave a short account of a paper entitled "Essex as a Wine-Producing County," by Mr. Miller Christy, F.L.S. This paper has already been printed in the present volume of the *ESSEX NATURALIST* (*ante* pp. 34-48).

Some time was spent in rambling about the very attractive grounds of the house. The dungeons were visited and the 'museum,' the precise information on the rarities therein contained given by the attendant causing much amusement. The most interesting curiosity of the collection is the Great Bed of Ware. It is thus mentioned in Cussan's *History of Hertfordshire* (1870):—

'The 'Great Bed,' mentioned by Shakespeare, and of which everyone has heard, demands a passing notice. It was originally in the 'Crown Inn,' and on the demolition of that building in June, 1765, it was transferred to the 'Bull,' whence it was afterwards removed to the 'Saracen's Head.' It is said to be upwards of four hundred years old, but the style of carving does not indicate a period earlier than that of Queen Elizabeth; the date, 1463, painted at the head is comparatively modern. In form it is nearly square, each side being about twelve feet in length; the massive posts are plain at the bottom, and at about two feet from the ground are four pillars, one at each angle of the posts. These pillars support four arches, above which the posts, elaborately carved, continue for about four feet more; the total height being about eight feet. The canopy and the head of the Bed are finely carved; the latter, with human figures, fluted work, heraldic roses, and gothic arches. Its beauty is much marred by initials and names cut by idle sightseers, amongst whom 'Mr. William Harrison, of Saxelby, Lincolnshire a Malitian, 1761,' is most conspicuous.'

The relic was purchased at the sale at the "Saracen's Head" by Mr. Teale, and added to the curiosities of Rye House. A description of the Bed, with a picture of it, was given in the *Literary World*, of January, 1840.

The remarkable display of the fine yellow "Musk" plant on the banks of the river, after leaving the Rye House again, attracted much attention. This plant has been hitherto recorded in all our Floras and local lists as an alien under the name of *Mimulus luteus*, L. It now appears probable that all the records of it apply to *M. langsdorffii*, Dow (North American). The distinctions between this and other species, previously grouped under the name *M. luteus* from the true (South American) plant of Linne, were given by Prof. E. L. Green in the *Journal of Botany* for 1895, pp. 4-8. The flower is specially interesting, as Mr. Hepworth remarks in the *Rochester Naturalist*, in possessing a curious bilabiate irritable stigma, which slowly closes when touched. It appears to be rapidly establishing itself in many places in England.

To resume Mr. Bramley's narrative, "a bridge was erected some years ago below the Rye House, in the place of one which had stood from the time of Charles, the timber of the old bridge being black as ebony. This is just above Field's Weir, which is so named from its being constructed by a family named Fielde, the owners of Rye House. Here the river Stort (on

which the malting town of Bishops Stortford stands) enters the Lea. Next comes Dobb's Weir and Tumbling Bay. I have never fished this district, but am tempted to visit the place some day, as it has a most inviting appearance, and hoists a public announcement that anglers may obtain tickets at the neighbouring hostelry—"The Fish and Eels"—on the bank, which we noticed in passing. Next comes Carthage Bay, the reason for which Spanish cognomen appears to be unknown. Here," Mr. Bramley adds, "I have spent many days with rod and line, and remember a once familiar angler, the late Charles Bradlaugh, M.P., whose name and angling skill will not be forgotten while so many specimens of his sportive success grace the walls of the hostelry just below, viz., the 'Crown' at Broxbourne. A change has come over the 'Crown' so far as ownership is concerned. Change is a law of nature, if law and change do not form an anachronism. Laws are immutable, and, in this respect, mutability is immutable. Anglers have for years known a distinctive figure, Mrs. Benningfield, whom probably they will know no more as hostess of the 'Crown,' for, although still continuing to reside in the neighbourhood, the lady has sold her interests in the house and gardens, and the fishing arrangements.

"King's Weir attracts us, and calls for a halt. We step on the bank and find an old friend and well-known angler drinking in the breezes of this healthful place, and in the closing act of struggling with a 3lb. bream. There are several chub flaunting their bright backs before we leave. The pool here is rented by some half-dozen London anglers, who appear to have in hand what is commonly described as 'a good thing.' Eels are said to abound; chub and bream, too."

On the way Mr. Holmes discourses on some salient points in the geology and geography of the valleys along which we are steaming, and Mr. Webb exhibits the mollusca found, giving some interesting talk on their habits and mode of occurrence. Mr. Webb also exhibited a fine specimen of the very curious "graft-hybrid" *Cytisus laburnum-adami*, which came from Mr. Winstone's garden at Epping. A copious description of this form, so interesting to plant physiologists, will be found in the English translation of Kerner's *Natural History of Plants*, II., 570-1. It will be remembered that a specimen from a garden at Buckhurst Hill was exhibited by Prof. Boulger, at a meeting of the Club on May 24th, 1884 (see *Journal of Proceedings, E.F.C.*, vol. iv., p. c.)

A very refreshing tea, with plenty of fruit, was served on board. Very cordial votes of thanks were passed to Major Flower for his kindness so often shown, and also to the Lee Conservance for the use of the boat, and to Mr. Corble for the trouble he had taken in connection with this, our fourth voyage, and we found ourselves approaching Waltham Abbey, the end of the excursion for most of the party. As Mr. Bramley writes:—"These last few miles for quiet sylvan beauty are not the least attractive. In the distance we view groves of trees, behind which are some extensive works for the manufacture of gunpowder, cordite, &c., which stimulate our martial pride in this age of actual wars and rumours of wars. Waltham is noted for its neighbouring old-time convents, its former line of 27 abbots and numerous monks, and the famous Abbey, which has held its own for centuries. Tradition ascribes the first thoughts of the Reformation to have been hatched in the mind of

Henry VIII. when at this place, pursuing his favourite private amusement (please interpret lightly), respecting which latter Fuller, the last Abbot of Waltham, and Church historian, sneeringly refers to the monarch to whom he surrendered his estates, saying, 'Waltham bells told no tales when the king came there.'"

Waltham Abbey was reached a few minutes after 7 o'clock, and there a number of the party went ashore for the train; the remainder continued the journey in the barge to Enfield Lock, where carriages awaited them, and they closed an exceedingly delightful day by driving towards the Forest villages, dropping members at cross roads convenient to their homes. Our chatty author, Mr. Bramley, continued his narrative to include the Lower Lea, which the Club ascended on a previous voyage; and having quoted so largely from his paper, we may allow him to finish the story:—

"Below Waltham, most places on the Lea are familiar in your mouths as household words—Ramney Marsh, Newmans Weir, Enfield Lock, Enefelde (so named from its being situated among fields); Tottenham, one of the places where the corpse of Queen Eleanor rested, and in memory of which a cross was erected.⁵ The famous cross of wood, covered with lead, as it existed in the time of our great master—Izaak Walton—and at which he at times rested when journeying to the River Lea in pursuit of his favourite pleasure, is described by him as a 'sweet shady arbour, interwoven of woodbine, sweetbriar, jessamine, and myrtle,' where he used to refresh himself, and drink 'sack, milk, oranges and sugar, which, all put together, make a drink like nectar; indeed, too good for any but us anglers.' Some anglers have enlarged upon this practice, and added other sweets. The river runs on by Clapton, Bow, Hackney, and Stratford (the old river), to discharge, *via* Bow Creek, into the Thames near the Isle of Dogs—so named from the dog kennels of Henry VIII. being placed on that small isle, north of the river opposite the King's palace at Greenwich, from which palace the barking of the dogs was sometimes audible. The other entrance to the Thames is at Limehouse, by the New Cut made in 1767.

"We have traversed a great portion of the stream at those parts which our great master so frequently visited and referred to with so much tenderness. However interesting may be the events connected with past history in relation to this river, there are none which appeal to our hearts with greater force than the fact that Izaak Walton's classic work, *The Compleat Angler*, records in charmingly simple language numerous visits to its waters made by that dear old fellow, who trudged many weary miles to its banks before steam engines or steamboats were known, and when even the means of being helped partly on the road by horse or any kind of vehicle must have been practically non-existent. This is a paper, not on Walton, but on the stream frequented by him. That the prince of anglers, and the greatest of angling authors, should have fished the Lea so persistently, and described it so affectionately in his happy dialogues, has given fame to the stream, and justifies, I submit, the choice of title to this paper—'Walton's Favourite River.'"

⁵ This is a popular error: Tottenham Cross was one of the wayside crosses once so common in England. See J. E. Harting, "Izaak Walton's Association with the River Lea," *THE ESSEX NATURALIST*, viii., pp. 186-198, where a picture of the Cross is given.

The publication of several Reports of Meetings is unavoidably deferred until the next part.]

NOTES— ORIGINAL AND SELECTED.

ZOOLOGY.

MAMMALIA.

Otters in Essex.—Dr. Laver remarks in his *Mammals, &c., of Essex* that “this animal is not as uncommon in Essex as in years gone by, when there seemed every probability that the otter would become quite extinct in this county.” The increase of otters may be credited, judging from the many references to their occurrence in our volumes for the last eight or ten years. But they are frequently shot or otherwise killed in the most ruthless manner. In March an otter was shot in the saltings near the “Leavingo” at Tollesbury. It was a fine male, measuring 4 feet from the snout to the tip of the tail. A few weeks before a female was shot in the same place. On May 10th another “noble sportsman” of Sible Hedingham, shot three otters, two young ones and their mother, in the wash-way of the river there. “The animals were playing in the water when they were observed.” Not content with spasmodic slaughter, other “sportsmen” (male and female) must needs establish otter hounds, and we read of a hunt in the Blackwater in April, when one was found at Little Braxted Mill; again at Shalford in September the hounds killed a dog otter weight 22lbs. A few days after one was hunted at Passingford Bridge and lost, but afterwards another was killed weighing 23lbs. If these otter hunts are encouraged, we may soon bid goodbye to *Lutra vulgaris* in Essex. It is difficult to realize what satisfaction can be found in thus deliberately exterminating one of the most interesting denizens of the county.

Truly

“Satan finds some mischief still
For idle hands to do!”

A White Fox near Billericay.—In the Essex Union country there is at the present time a freak in the shape of a snow-white fox. This is one of a litter of four (the other three being of a normal colour) which were bred in Norsey Wood, an extensive woodland near Billericay. During the summer months the keeper had on three occasions seen this cub in the covert, which was drawn on Oct. 14, for the first time this season. The white cub was soon *en évidence*, and was viewed by several of the field as he crossed the rides. There being no scent, however, nothing could be done. Probably you or some of your readers may have heard of other instances of white foxes in England; but the only authentic case I know of is that mentioned by Colonel Meysey-Thompson in his book published last year, in which he narrates how a white fox was hunted and eventually killed by the York and Ainsty Hounds during the late Sir Charles Slingsby's mastership. — E. T. MASHITER, M.F.H., in the *Field*, October 21st, 1899. [The Editor of the *Field* adds that several instances of white foxes in England have been reported from time to time. See the *Zoologist* for 1886, pp. 104 and 331, and 1891, p. 333; and the *Field* of Nov. 5, 1898.

The Porpoise (*Phocaena communis*) in the Thames.—According to the *London Standard*, much interest was excited shortly before 11 o'clock on the morning of September 13th, 1899, among persons passing over Blackfriars

Bridge, at the sight of a large number of porpoises sporting themselves in the Thames close by the bridge. Their antics were most amusing. After remaining for a time in the vicinity of the bridge, they made off in the direction of Westminster. It is an indication of the improving condition of the Thames that this gregarious Cetacean, common enough off the Essex coast, should ascend so far up London's river. The porpoises probably did so in the pursuit of some kinds of fish.

AVES.

Little Owl (*Athene noctua*, Scopoli), at Harlow.—A specimen of this exceedingly rare bird is reported (in the *Essex County Chronicle* for October 27th, 1899), as having been caught in a rabbit trap at Harlow. It is in the hands of Messrs. Tyler and Ringer, of Bishop Stortford, for preservation. We hope to obtain further details. The bird has only occurred about 20 times in England, and according to Mr. Saunders there is some doubt as to the truly wild nature of at least some of these examples. In Essex, according to Christy (*Birds of Essex*, 161), the only really authentic specimen is that in Mr. G. P. Hope's collection at Havering Grange, found dead in a plantation in Chigwell, in 1865.

The Sea-Gulls on the Thames—"London's sea-gulls have just returned to town, and the pigeons on the Embankment, near Blackfriars Bridge, are once more turning green with envy. The gulls have nearly all arrived, and yesterday (October 12th), during the dinner hour, the bridge and the Embankment near it were lined with spectators, who threw morsels of food to the welcome birds. The gulls—there were a couple of hundred of them—wheeled about in the air in thorough enjoyment of the fun, and screamed shrilly as they swooped down and carried off the scraps. The game lasted about an hour, and everybody enjoyed it—except the hundred pigeons who live on the Embankment, near Blackfriars Bridge, all the year round. To the pigeons the winter brings feelings of disgust and despair. The gulls turn up in scores and monopolise public attention, and the pigeons vainly endeavour, in their longing for notoriety, to try and look like sea-gulls. They start below the bridge, come flying up at lightning speed, and then, spreading their wings, try and float about in the air like their more buoyant antagonists. But it generally ends in failure. A sudden gust upsets the sailing pigeon's balance, and either flings him perilously near the bridge or sweeps him away up stream."—*Daily Mail*, October 13th, 1899. A note by Mr. Howard Saunders, on the species of Gulls frequenting the Thames during the last three or four years, will be found in the last volume (*E. N.*, vol. x., p. 392). The Gulls are now (November) very much in evidence in the air opposite Somerset House; they may be seen also by dozens resting on the floating barges keenly on the look-out for passing food. B. G. COLE.

BATRACHIA

Palmated Newt (*Molge palmata*) at Buckhurst Hill, Essex.—During a hunt for pond animals in this neighbourhood in June last, I was delighted to find *Molge palmata* somewhat commonly. The merit of first discovering the species in the Forest belongs to Dr. G. A. Boulanger, F.R.S., who found it in a small pit near Chingford Station (see *ESSEX NATURALIST* vol. I., p. 8). This pretty newt will probably be detected in other parts of

the county, if well looked for; Dr. Laver has found it abundantly in a pond of Donyland Heath. As pointed out in the above quoted note, the absence on pigment on the throat affords a ready means of distinguishing *M. palmata* from *M. vulgaris*, independently of the other and better known characters.—
WILLIAM COLE, Buckhurst Hill, Essex.

PISCES.

Blennius gattorugine in Essex.—In the *Zoologist* for June (4th ser., vol. iii., p. 273), Mr. A. Patterson records the capture of this species at Great Yarmouth, for the first time in East Anglian waters. It measured 4in. in length, and the fish "was not at all highly coloured, as depicted by Couch, but was of a dull tawny or yellow-brown, the edges of the fins being of a ruddy hue. Day speaks of it as being subject to variation, according to locality, and, no doubt, on our sandy coast, such a stray fish would assume more sober tints than in its native rocky habitat." At page 326 of the same volume, Mr. E. A. Fitch reports that he has one caught in the Essex Blackwater, off Stansgate, on August 19th, 1898, by Sampson Wright. He adds, "it is typical with Day's figure and description, and measures 5½in. long. I have it preserved in 4 per cent. formalin, and it looks as fresh as when I had it alive." The Editor of the *Zoologist* remarks on the above as follows:—"The Gattorugine, known to fishermen in the West of England by the homely appellation of Tompot (Couch) has been recorded from the north-east coast included in Sir Cuthbert Sharp's List of Hartlepool Fishes; cf. R. Howse, 'Cat. Fishes of the Rivers and Coast of Northumberland and Durham,' p. 25. It is reported as lying concealed in pools among long seaweeds, where it is probably often overlooked."

Angling in the Lea River half a century ago.—Mr. Francis Howse, Hon. Secretary of the Amwell Magna Fishery, has kindly presented to our library a copy of a pamphlet which he has prepared and printed for private circulation, being a record of notable fish taken in this famous fishery by members and their friends between 1851 and 1871, and based upon a diary kept by the late Robert Brown, the keeper. The fish mentioned are jack, roach, trout, gudgeon, perch, carp, chub, tench, and rudd, the last three very rarely. The Fish Editor of the *Field* has given the following analysis of the record:—"The falling off in late years in the numbers and weight of jack is attributed, to a great extent, to the smaller volume of water in the old Lea River, caused partly by a more efficient system of land drainage, and partly by the large quantity of water drawn off by the Companies. To these causes must also be added the strenuous efforts made to reduce the pike in the New River. It must be also remembered that, during the twenty years under review, there were only fourteen members, and that for some years that number has been increased to twenty-five."

"The large and always specifically handsome trout of the Lea (as they remain to this day) appear in the earliest of the records, not, of course, in quantity, but at fairly frequent intervals. Mr. T. Howse, the well-remembered father of the editor of this memorial, was one of the most successful pike fishers from the fifties onwards. The best season for pike during the twenty years covered by the entries was apparently that of 1860-1, when 95½

brace of jack were taken. The weight of these is not given, but they would probably be of about the same average as the $9\frac{1}{2}$ brace killed in 1856-7—total weight, 406lbs.

“On July 25th, 1861, there is an entry showing that Mr. T. Howse and his sons caught twenty-two brace of perch, four brace of ack, and two dozen gudgeon, in the lower water of the fishery. That must have been a red letter day indeed! The gudgeon have almost entirely disappeared from that part of the Lea (and many another part also), and there is no longer such perch fishing as was enjoyed during the years previous to 1861. Here are entries showing that Mr. T. Howse and son caught nineteen brace of perch, and Mr. Munt and Mr. McRae sixty-one and a half brace; Mr. Robert Wright (one of the old brotherhood who have gone to their rest) and Mr. Charles Briand (who is still an active member of several angling societies) are also entered as captors of a big bag of perch in 1860. There are frequent entries, indeed, showing very excellent perch fishing; Mr. Henry Wix, for example, had, in 1859, twenty perch weighing 16lbs., and seven chub weighing 9lbs., in Amwell Pond; and there are records, one after another, of sixty brace and forty-two brace of perch, eighteen dozen gudgeon, and so on. These, alas, are feats of the past. The common weight of the big trout appears to be 6lb., especially those caught at Ware Mill. The carp is mentioned once, the rudd only twice, and the only record of the tench is that of one of 2lbs. 6oz. in March, 1861, with the note ‘the first tench ever known to be taken at the fishery.’”

INSECTA.

Sirex gigas at Loughton.—Our Treasurer, Mr. W. C. Waller, sent up for the Museum a fine female specimen of *Sirex gigas* which has been caught in his garden at Loughton on July 9th, 1899 (see note in last volume (vol. x.) at page 189).

Acidalia rusticata at Shoeburyness, Essex.—I have taken a few specimens of *Acidalia rusticata* this season at Shoeburyness. Is there any early record of the occurrence of this species in Essex? But for my having seen two examples in a small collection formed by a beginner it's more than likely that I should not have captured this insect, as the spot where it occurs is on Government ground from which the public is excluded. The moth seems to be exceedingly local, and it is, therefore, a matter for congratulation that it is so effectually protected.—F. G. WHITTLE, Southend, August, 1899.

Calymnia pyralina and *Cucullia asteris* near Southend.—At the end of May, a friend was kind enough to allow me to accompany him to a locality some few miles north-west of Southend (I cannot be more precise), where larvæ of *Thecla w-album* and *Calymnia pyralina* might be expected to occur. We did not see *T. w-album*, but sundry *Calymnia* larvæ were beaten from which I reared, about the middle of July, three *C. affinis* and three *C. pyralina*. I found yesterday a larvæ of *Cucullia asteris* on a plant of *Aster tripolium* at Great Wakering.—F. G. WHITTLE, Southend, September 18th, 1899.

Glow-worm and Frog.—On the evening of September 2nd as my brother and I were passing along the Epping New Road, near “Kates Cellar,” Broom Hill, we saw a glow-worm's tiny lamp shining on a bank by the wayside. As we got off our cycles for a nearer view, the spark suddenly disappeared, and on turning the light of a lantern on to the spot we were just

in time to see a frog hopping away. *Lampyrus notiluca* was not to be found and she was presumably down froggy's gullet! We have not seen the glow-worm in the forest for many years. About 1870-82, they were very common at Buckhurst Hill, but since the latter year not a specimen has been seen by me until that solitary one occurred as above mentioned. I am disposed to attribute the disappearance of this very interesting beetle to the increase of snail-devouring birds. Snails are certainly getting scarcer in the open year by year, and with them diminish the glow-worms which subsist upon the molluscs. I should be glad to know from collectors whether *Lampyrus* is now rare in other places around London. Years ago the males were plentiful enough with us in the Kentish, Surrey and Essex woods, dashing at night against our entomological lanterns, whilst the females often glistened by scores on the grassy banks—a charming and poetical sight.—W. COLE, Buckhurst Hill, November, 1899.

CRUSTACEA.

The "Well-Shrimp" *Niphargus* in East Anglia.—In connection with the Rev. T. R. R. Stebbing's address at the Conference of Local Scientific Societies at Dover (*ante* p 70), it may be interesting to refer to a paper by Dr. Sidney F Harmer, F R S., in the current part of the *Transactions of the Norfolk and Norwich Naturalists' Society* (vol. vi., p 489), recording the occurrence of *Niphargus aquilex*, Schiödte, at Cringleford, near Norwich. *Niphargus* is a small Amphipod Crustacean, with rudimentary eyes, and is interesting, Dr. Harmer says, as being a typical member of the Cavernicolous fauna. It can readily be distinguished from *Gammarus pulex*, the common "Freshwater Shrimp," by its colourless, semi-transparent appearance, and by the slenderness of its form. Three species are recognised as British by Spence Bate and Westwood (*History of the British Sessile-eyed Crustacea*, vol. i. (1863), pp. 311-325), viz., *N. kochianus*, *N. fontanus*, and *N. aquilex*. Dr. Harmer gives many details of distribution of members of the genus, and alludes to the very complete summary of the literature of the Amphipoda, including papers on *Niphargus*, given by the Rev. T. R. R. Stebbing, in the *Challenger Reports* (vol. xxix, pt. lxxvii., 1888). We hope that some of our observers will search for this interesting Crustacean (together with the well-worm, *Phreocystes*, *ante*, p. 1), in suitable localities in Essex. It is probably a common form, if well looked for. Mr. Stebbing informs us that an old lady had lately told him that she was familiar with the Well-shrimp at Norwich in her youth. Dr. Harmer suggests that the device employed by Prof. Herdman in the examination of the surface fauna of the ocean (*Brit. Ass. Rep.*, 1897, p. 695), viz., by tying a muslin bag over the taps through which the water may be pumped, or is flowing, may lead to the detection of the shrimp. *Niphargus* has been recorded from several southern English counties, and from many Continental localities.—ED.

MOLLUSCA.

Mollusca in the Old Bed of the Lea River.—The Rev. J. W. Horsley, St. Peter's Rectory, Walworth, has communicated to *Science Gossip* (vol. vi., N.S., 18) some interesting notes on the Mollusca observed in the old bed of the river Lea, near Park Station, Tottenham, during a recent excursion of the Conchological Society. The observations, he remarks, showed what "a

wealth of Molluscan life there existed, and now has been utterly destroyed by the diversion of the stream in the formation of some huge reservoirs for the East London Water Company. In many cases the bed was covered with shells, amongst which were noticed *Succinea elegans*, fine, but decorticated; *Vivipara vivipara*, the green bandless variety by no means rare; *Neritana fluviatilis*, varying much in colour, from a black and white tessellated form to a pretty crimson one; many also were trifasciated. *Valvata piscinalis*; *Bythinia tentaculata*, and its variety *alba*, and a few specimens showing a pathological (?) white line on the periphery; *Limnæa peregere*; *L. auricularia*, *L. fulustris*, not common, and *L. stagnalis*. Of the last, some were very thin-shelled, and showed marked ribs or striations, and one or two specimens found by me were beautifully banded with white. *Planorbis corneus* was plentiful, but local, and several places were found covered with its shells, which had been eaten, probably, by *Dytiscus marginalis* [see *Jour. of Malacology*, vol. vi., 30], by the removal of the whole of one side of the shells, leaving the other perfect. They were collected, after the manner of *H. nemoralis*, round a 'thrush' stone. *Planorbis marginatus*, *P. carinatus*, *P. vortex*, and *P. albus*. *Pisidium fontinale* and *P. amnicum*; *Sphærium corneum*, very fine; *S. lacustre* and *S. rivicola*, abundant in spots, and fine; *Anodonta cygneus*, and the form called *anatina* of *Unio pictorum*, and *U. tumidus*, the latter of the two far outnumbering the former."

Duration of life of *Helix pomatia*.—It may be interesting to put on record a fact bearing upon longevity in the Mollusca. On the 3rd of June, 1894, in company with Prof. Meldola, I found two living specimens of *Helix pomatia* at Newlands Corner, near Gomshall, Surrey. The snails were quite full grown, but I have no evidence of their age when taken. We kept them as pets, and fed them, when active, exclusively upon garden lettuce. They hibernated every year, by closing up the mouth of the shell with the secreted epiphragm. from October to about the end of March or beginning of April. One of the specimens was accidentally killed at the end of two years, but its companion is still alive and apparently quite healthy, judging from its weight, although now (November, 1899) in its winter sleep. Presuming the *Helix* was two years old when found, it is now at least $7\frac{1}{2}$ years old and I hope that it may live much longer.—B. G. COLE, Buckhurst Hill.

BOTANY.

PHANEROGAMIA.

Notes on Essex Plants—*Valerianella auricula*, D.C. At pages 228-9 of vol. ix. ESSEX NATURALIST, a new habitat (Coggeshall) for this plant is recorded. It may be of interest to give two more places where it has been recently found, more especially as I believe it had been apparently lost to the County Flora for nearly twenty years, the original locality (Walls of Colchester), as given in Gibson's *Flora*, not now furnishing specimens. One plant was found in a field at the Fennes, Bocking, in 1898, and several at Rayne in 1899, all the localities being corn-fields.

Bupleurum rotundifolium, L. occurs sparingly in corn-fields at Rayne. The nearest station given in Gibson's *Flora* is White Notley.

Lemna minor, L.; *L. polyrrhiza*, L.; and *L. gibba*, L., were all found associated in one pond near Danbury, in August, 1899. This last is a rare and local species.—EDWIN E. TURNER, Coggeshall.

Epipactis latifolia Sw. [Bentham; *media* Fr. Bab.]—In a coppice the lower extremity of the wood (part of the old Hainault Forest), between Chigwell Row Church and the open plain at Lambourne End, on July 17th, 1899, flowers not quite open. On August 23rd I found three specimens in full bloom. On the latter day, Mr. S. Arthur Sewell was with me, and we verified the plants by Bentham and Sowerby.—(Rev.) ALFRED HUDDLE, M.A., Buckhurst Hill.

[In the small collection of plants gathered by J. Ray, of Epping, recently acquired for our Museum, are two specimens of *Epipactis* from Epping, labelled *latifolia*. Gibson gives both forms as occurring rarely in woods near Epping and Woodford, but Newbold remarks (*Flora*, p. 309), "as most, if not all, of the Cambridge stations for *E. latifolia* produce only *E. media*, the same may be the case in Essex."—ED.]

Rhamnus frangula, L., in Epping Forest.—This shrub I first found (at Mr. F. W. Elliott's station, E.N., x, 397) on June 7th, 1892. Strolling on August 25th, 1899, through Leyton Flats, from Eagle Pond towards Whipp's Cross, in the coppice where formerly I had found it, I counted 8 scattered specimens, varying from 4 to 10 feet high, and one isolated specimen (unfortunately cut down during a recent forest fire, but throwing up vigorous shoots) a furlong south-west of the coppice. The coppice runs parallel to the Snaresbrook Road, near the Eagle Pond.—(Rev.) ALFRED HUDDLE, M.A., Buckhurst Hill, October 25th, 1899.

The Old Yew Tree in Woodford Churchyard, Essex. During a correspondence in the *London Standard* in May last some interesting details were given of this old yew. In 1899, Dr. Hughson, in his *London*, stated that the tree was the largest within twelve miles of London, and measured 14 feet 3 inches round at four and a half feet from the ground, and that the spread of its branches covered a circle 180 feet in circumference. Mr. W. Bradbrooke, of Bletchley, said that in October, 1892, he found the Woodford yew to measure over 15 feet round and the spread of the branches to be about 150 feet. Mr. Henry Spring, of Woodford, gave the dimensions as 15 feet in girth at 2½ feet from the ground, and 18 feet girth at 5 up. He added "the Rector, the Rev. A. Hughes, informs me that there is a record that in the year 1816, when Woodford Church was re-built, the spread of the branches was 180 feet, and this is probably correct, judging from an old engraving of it. It is generally believed to be about 800 years old." Curiously enough, this tree is not mentioned in Warner's *Plantæ Woodfordienses*.

Practical Instruction in Botany in the London Parks.—An excellent suggestion has been made to utilise the parks of London for the teaching of practical botany in connection with elementary and secondary schools. It is proposed that plots of ground should be laid out and devoted to the cultivation, for school purposes, of hardy plants belonging to some twenty typical natural orders. The beds would be arranged near the paths, one bed being devoted to each order. A botanical guide to the parks might also be published, under the superintendence of the Technical Education Board and the Parks Committee jointly, and teachers would be enabled to obtain from the superintendent in each park such specimens as are required for botanical study in the schools, as far as they could be supplied without detriment to the plants themselves. The experiment is to be tried, and if later on it should prove to

be successful, arrangements might possibly be made to extend the cultivation of important types of the lower orders of plants, such as fungi, mosses, ferns, liverworts, &c., and also of aquatic plants. Battersea, Ravenscourt, and Victoria Parks have been selected for the first experiments, the total costs of which must not exceed £200. Battersea Park is already famous for its fine sub-tropical gardens, which are greatly appreciated by botanists.

FUNGI.

Notes on Microscopic Fungi.—*Æcidium leucospermum*, D.C., the *Anemone* Cluster-cup. As this species is stated to be rare in this country (Dr. M. C. Cooke writing, "we have found it but seldom, though often in search of it;" and Dr. Plowright observing of it "rare in Britain") it may be of interest to record the species for Essex. It was found on leaves of *Anemone nemorosa*, in a wood near Witham, in May and June last. I believe that this is the first record for our county.

Puccinea betonica, Alb. and Schw. Betony Brand This occurred to me on leaves of *Stachys betonica*, growing on a piece of waste land in the parish of Little Braxstead, in the month of June.—EDWIN E. TURNER, Coggeshall, Essex, July 5th, 1899.

New locality for *Polyporus umbellatus*, Fries.—Mr. E. W. Swanton writes in the *Journal of Botany* (vol xxxvi., 399) to "place on record another locality for this rare and interesting fungus, hitherto only recorded from Epping Forest. A few days ago I received a specimen gathered from a wood at Inval, near Haslemere. This species is allied to *P. intybaccus* [which also occurs in Epping Forest] and differs in the numerous much-branched pileoli being circular and depressed; in *P. intybaccus* they are dimidiated."

PALÆONTOLOGY.

The New Fossil Bird (*Prophaeton shrubsolei*) from the London Clay.—The *Standard* of July 27th, 1899, had the following particulars of this interesting discovery:—"The British Museum (Natural History) has acquired a very interesting fossil bird, which was recently discovered in the Isle of Sheppy, enclosed in a large nodule of London Clay, by Mr W. H. Shrubsole. The remains, consisting of skull, pelvis, thigh-bone, and shoulder-bone, have been carefully worked out of the clay matrix at the Museum, and determined by Mr. C. W. Andrews, B.Sc., of the Geological Department, to be a hitherto unknown form of the Order Steganopodes (now represented in this country by the Gannet, Cormorant, and Shag), in which all the four toes are united by a web. He believes that it was allied to the Frigate-birds, and more closely to the Tropic-bird, both of which are now practically confined to the tropical regions. There is, however, a striking difference in the size of the hind limbs, which are relatively much larger in the newly-discovered fossil than they are in the living Tropic-birds, in which, as in the Frigate-birds, they have undergone great reduction, owing to these species having abandoned the habits of diving and swimming common to other members of the order. The Frigate-birds are as great robbers as the Skuas, their chief victims being the Gannets, while the Tropic-birds are surface feeders, picking up fish that swim near the top of the water. But these birds spend most of

the time on the wing, and are rarely seen on land, so that, as a consequence of the hind limbs not being used for swimming or walking, they have degenerated. Mr. Andrews has called this new bird-form *Prophaeton shrubsolei*; the generic name records the fact that it stands in the line of descent of the modern Tropic-birds (the genus *Phaeton*), while the specific name is given in honour of the discoverer. This find is of considerable interest, for it is another proof of the change that has taken place in the climate of England since the early Eocene times, as is also evidenced by the fossil palm fruits from the same locality, and it adds one more steganopodous bird to our fossil fauna, which now contains four, the others being the Pelican, from the fens of East Anglia and the lake-dwellings at Glastonbury; *Odontopteryx*, with serrated jaws, like those of some tortoises; and *Argillornis*, both from the London Clay at Sheppey."

Fossils of the London Clay.—At a meeting of the Geologists' Association at Sheppey, on July 16th, 1898, (*Proc. Geol. Ass.* vol. xv., November, 1898, Mr. W. H. Shrubsole, F.G.S., who has done so much to elucidate the very obscure paleontology of the London Clay, gave some information concerning his own discoveries. The remarkable mineralised Diatoms¹ occurred in a zone (having a considerable range) near the base of the London Clay, and therefore only to be reached in Sheppey by deep excavation. *Radiolaria*² in a pyritised condition, had also been found in clay from a well near Queenboro' Railway Station. The only freshwater shells, *Camptoceras friscum*,³ known to occur in the London Clay, he found in a septarian nodule. The skull and other portions of the skeleton of the toothed bird, *Argillornis longifennis*⁴ were found at different times among the shingle on the beach, unobscured either by limestone or pyrites. The immense skull of *Chelone gigas*⁵ (*Eosphargis gigas*) was enclosed in a septarian nodule, the outline of which furnished the only clue to something organic within. Interesting reference was made to its skilful exhumation at the British Museum, and the delights of Sir Richard Owen at finding such complete evidence of a gigantic Chelonian, the existence of which was foreshadowed forty years before by a small fragment of bone, on which the name has been bestowed.

The most recent discovery was the skull of another bird in 1897. Unlike the *Argillornis*, it was enclosed in a limestone nodule of oval form, at one end of which the base of the cranium was slightly exposed. The expert mason of the British Museum soon revealed what appears to be a perfect avian skull.⁶

GEOLOGY.

Sketch of the Geology of Ilford.—On May 13th last the Geologists' Association paid a visit to Ilford, that classic land for Essex palæontologists, under the direction of Mr. T. V. Holmes, F.G.S., who favoured the company with an interesting sketch of the geology of the district. This, by Mr. Holmes' kind permission, we are now able to reproduce. A visit was made to the

¹ See *Journ. Royal Microscopical Soc.*, 1881.

² See *Quart. Journ. Geol. Soc.*, vol. xlv, 1889, p. 121.

³ *Ibid.*, vol. xxxviii, 1882, p. 218.

⁴ *Ibid.*, vols. xxxiv. and xxxvi.

⁵ *Ibid.*, vol. xlv; *Cat. Fossil Reptilia, Brit. Museum*, part 3; Owens *Palæontology*, 2nd edition, pp. 317, 318.

⁶ See note on this fossil bird above.

Cauliflower Brickfield, the property of Mr. R. Page, where the pit exposed a section of 12 to 14 feet brick-earth above sand. Mr. Holmes remarked that the old river deposits of the Thames and its tributaries, on which they were standing, covered a broad belt of flat country lying between the alluvial flats bordering the Thames (which constitute the most recent river deposits) and the higher ground of London Clay north of Wanstead, Romford, and Upminster. The level of this tract varied from more than 100 feet above the sea, towards its northern limits, to 15 or 16 feet close to the marshes of the Thames between Barking and Rainham. Between London and Gravesend, as between Windsor and London, the Thames had not only been cutting its valley deeper and deeper, but had also been occupied in taking a more southerly course than it once followed. This was shown by the much greater breadth of river deposits to the north than to the south of the present stream. It should also be remembered that the fall of the river would make a deposit 60 or 70 feet above Ordnance Datum west of London, for example, the equivalent of a bed at a considerably lower level east of that city. Around the Ilford brick-pits the surface level is from 40 to 50 feet. But Thames Valley Gravel had been seen at a height of about 100 feet above O. D., on the new railway between Upminster and Romford, overlying the Chalky Boulder-Clay, the latest deposit of the Glacial period in that part of England. The Ilford deposits must therefore be still more decidedly "Post-Glacial" in the only sense in which the term can be used, that is in the sense of being more recent than the Chalky Boulder-Clay.

These old river-deposits consist of sand and gravel occasionally capped, as at Ilford, by a considerable thickness of loam or brick-earth. The gravel and sand has, doubtless, been brought down in the channel of the stream, while the brick-earth is inundation-mud, deposited above the sand and gravel during floods. Mammals would be especially liable to be drowned during floods, while at the same time their remains, when quietly buried in the comparatively impermeable mud, would have a much better chance of preservation than if brought down in the channel of the stream.

Mr. Holmes concluded his remarks by referring to the most important and interesting of the mammalian remains which had been found at Ilford by the late Sir Antonio Brady and others.² In answer to a question as to the origin of the curious steep-sided hollows, filled largely with other material, often seen near the surface of the Brick-earth, Mr. Holmes replied that they had probably originated in natural cracks, the result of drying and shrinking, which in many cases had been begun when the Brick-earth was being deposited. These had been enlarged by the action of the weather, and ultimately filled up with material at various periods and from a variety of sources.

Recrossing the railway, the party proceeded along the Romford road in a north-easterly direction. Passing the new Seven Kings Railway Station, they entered, by permission of the G. E. R. Company, the large ballast-pit on the northern side of the Romford road, about midway between Seven

¹ *Quart. Journ. Geol. Soc.* v. l. xlviii (1892), p. 365, and vol. l. (1894), p. 413. *ESSEX NAT.* vol. iv, p. 143-144; and vol. vii, p. 1-14.

² See Henry Walker, "A Day's Elephant Hunting in Essex," *Trans. Essex Field Club*, l. 27, and *Proc. E.F.C.*, l. xii, and "A Visit to Ilford," p. xxviii, Dr. H. Woodward, "The Ancient Fauna of Essex," *Trans. E.F.C.*, vol. iii, l. Sir A. Brady, *Catalogue of the Pleistocene Vertebrata from the neighbourhood of Ilford, Essex*. London, 1874.

Kings and Chadwell Heath Stations. There they found 12 to 14 feet of Gravel capped by 3 or 4 feet of Brick-earth. The section was very fresh and clear, and the gravel was seen to be very well stratified and uniform in composition.³

MISCELLANEA.

The Countess of Warwick's Village Science School.—We have much pleasure in recording further progress in the conduct of this institution, the development of which is being followed with so much interest and hopeful expectation by the friends of scientific education throughout the country. The inauguration of the school at Bigods near Dunmow on July 29th, 1898, was commented upon in the last volume of the *ESSEX NATURALIST* (vol. x., p. 376). On Friday, July 28th last, a very large and distinguished company assembled at the School to celebrate the first annual prize distribution. Among the speakers were Sir John Gorst (*Vice-President of the Council of Education*), Sir John Donnelly, Mr. J. Round, M.P., Prof. Marshall Ward, F.R.S., Prof. Tilden, F.R.S., Mr. Bottomley, Prof. Teegan, Mrs. Brydges Adam and Mr. McCann. The speakers one and all commended the experiment as a praiseworthy attempt to solve a most difficult problem. Sir John Gorst's speech has attracted very considerable notice not only by reason of its importance as being the views of the leader of education in this country, but also because of the home-truths which he expressed in humorous and somewhat paradoxical language, as for instance when he said that in England "he did not think we were teaching the right things. He very gravely doubted whether reading, writing, and arithmetic and that most useless of all branches of knowledge, grammar—were exactly the intellectual food upon which to develop the intelligence of country lads and lasses." One great benefit to be derived from Lady Warwick's experiment is that her position thus assumed as a practical educationist is attracting a widespread interest in the problem of how to impart to children real instruction in science which will be useful to them in after life, while at the same time affording a good sound educational training. A pamphlet has been issued by Lady Warwick and Prof. Meldola, F.R.S. (who is so efficiently acting as her scientific adviser) entitled "A Plea for Secondary Rural Education" which all well-wishes of progress in village life should read. The authors sum up the case by saying "We know that our system is sound; we are confident that such pupils as we hope in time to turn out would sweep all before them if sent on to agricultural colleges. Our confidence rests upon the fact that from the beginning of the child's education to the end, the science subjects will never be dropped, but will be carried on the higher and higher stages." The kind of training given at Bigods is probably unique in experiments in elementary education in England. For the first time science is treated as an integral part of the child's education, not as an "extra," to be taken upon sufferance and dropped at the first pretext.

Queen Elizabeth's Lodge and the Epping Forest Museum.—The news that the Corporation of London had voted a large sum towards the

³ References to the Geology of Ilford. Geological Survey Map, Sheet 1, S.W. Drift Edition. Dr. H. Woodward, *Record of Excursions*, Lond. Geol. Assn., p. 173 and *Proc. Geol. Assoc.*, vol. ii, p. 273. W. Whitaker, "The Geology of London," *Mem. Geol. Survey*, pp. 410-415. B. B. Woodward, "The Pleistocene Mollusca of the London District," *Proc. Geol. Assoc.*, vol. xi, pp. 365-371, 1888. A. S. Kennard and B. B. Woodward, "The Post-Pliocene Non-Marine Mollusca of Essex," *ESSEX NAT.* x, p. 103. F. C. Spurrell, "Excursion to Ilford," *Proc. Geol. Assoc.*, vol. xiii, p. 53.

restoration of the Lodge excited very considerable public interest and a large number of newspapers, as well metropolitan as provincial, took notice of the affair in paragraphs and short "leaders." As a specimen, a leader which appeared in the London *Daily Telegraph* may be quoted:—"That much-maligned body, the Corporation of London, acts as the custodian of many places of great historical interest in the immediate vicinity of the Metropolis, and its bitterest critics can find little fault with the way in which it carries out this important public trust. It is now engaged in restoring the famous Hunting Lodge at Chingford, which for the last few years has been the home of the Epping Forest Museum, so as to provide double the present accommodation for the Essex Field Club's exhibits. The intention is to reorganise the collection, and possibly supplement it with a loan of art objects, and thus make it, so to speak, an annexe of the museum now being erected at Stratford. The scheme is one that will commend itself to all antiquarians, and will greatly enhance the interest of the Hunting Lodge to the thousands who visit it year by year. Time has dealt very kindly with the fine old building, which takes its name from the Maiden Queen who constantly honoured it with her capricious presence when she hunted the hart in Epping Forest. Elizabeth, who had a strong taste for the classics, and more than the ordinary share of feminine vanity, delighted to hear her courtiers address her as Diana of the Woods, and there are portraits of her still extant in which she carries the bow of Artemis and is accompanied by her faithful hounds. But the Tudor Queen was a thoroughly good sportswoman, in spite of all her affectation, and even at the age of fifty-seven, she indulged in the pleasures of the chase. Local tradition, indeed, has it that she used to ride up the massive staircase at the Chingford Hunting Lodge to the great chamber above, and alight by the door at a raised place which for centuries has been known as 'the horse block.' The feat was successfully performed by a forester on an untrained pony seventy years ago, and the solid oak stairs, which are about six feet wide and run in fours, with six broad landings to the twenty-four steps, would still bear the weight of the heaviest charger. There is nothing impossible in the legend, therefore, and it is not at all improbable that the daughter of Henry VIII., who, in spite of her devotion to dress and her passion for colossal ruffs, farthingales, quiltings, slashings, and embroideries, could rap out tremendous oaths, and was so forgetful of strict etiquette as to box a courtier's ears and tickle the back of Leicester's neck when he knelt to receive his earldom, should show off her horsemanship by riding her palfrey up the staircase. The Lodge itself, with its gable ends, high-pitched roof, and old-fashioned fireplace in the basement, commanding a fine view across Epping Forest to High Beach and Buckhurst hill, makes an ideal museum, where the setting is as worthy of a visit as the exhibits themselves."

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The gathering together of specimens and collections and appliance for their conservation has been vigorously carried on during the last few years, but an immense amount of work yet remains to be done. Above all things is required *Systematic Collecting* in various parts of the county. If more members would take up definite groups, and endeavour to obtain *all the species in those groups* occurring in their districts, they would find the occupation a delightful and instructive one, and the results would be valuable not only to our Museums, but also in improving our County records, which are still so incomplete in many sections.

Gratifying aid could also be afforded by those having the means of obtaining isolated species, specimens of which are still unrepresented in our collections. I may particularly mention many BIRDS (coast species especially), and authenticated EGGS and NESTS; some species of MAMMALS, particularly the Bank Vole, the Shrews, Dormouse, and Harvest Mouse. FISHES from the Essex rivers, and the more uncommon marine species. Many kinds of MARINE MOLLUSCA and CRUSTACEA. Some of our rarer ECHINODERMATA, POLYZOA and SPONGES, &c. INSECTS of many families are required, particularly HEMIPTERA, ORTHOPTERA, and HYMENOPTERA. Authentic specimens of FLOWERING PLANTS from several parts of the county are also desired, as well as LEAF FUNGI and LICHENS.

I am striving to supply deficiencies, but our friends should remember that "many hands can make light work," and resolve to do their best to help during the memorable first year of the museum and the century. I shall be very glad to give full particulars as to any group, with hints on collecting, preservation, &c. Pending the removal of the Curator's Laboratory to the Museum, specimens should be sent to me at the temporary work-rooms, 9, *Woodgrange Road, Forest Gate, Essex.*

December, 1899.

WILLIAM COLE, *Curator.*



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The Essex Naturalist:

BEING THE JOURNAL

OF THE ESSEX FIELD CLUB.

EDITED BY WILLIAM COLE, F.L.S., F.E.S.,
Honorary Secretary and Curator.

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"Fortunately for this country, we have not been called upon to notice a report of such an earthquake as that which is chronicled in the volume before us since this journal came into existence. Indeed, the authors state that no shock approaching it in intensity has been experienced in the British Islands for at least four centuries. A brief notice of the occurrence was given in our columns (vol. xxx., pp. 17 and 60) by Mr. Topley, and we now have a complete scientific account drawn up by Prof. R. Meldola, and presented to the Essex Field Club as a special memoir, embodying the results of his investigation in conjunction with his colleague, Mr. William White. The book consists of about 225 pages of readable matter, with four maps and numerous illustrations, and the Essex Field Club has certainly earned the gratitude of scientific men in enabling the authors to give publicity to this final result of their labour. . . . Many illustrations of peculiar forms of damage are given, and there can be no doubt that the observations recorded in this section will be not only of local interest, but also of use to engineers and others who occupy themselves with the important question of Construction in Earthquake Countries. . . ."—*Nature*, January 21st, 1886.

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QUEEN ELIZABETH'S LODGE, EPPING FOREST.

NOTES ON THE ORIGINAL CONSTRUCTION AND USE OF THE BUILDING.

By W. W. LOVE.

(With Plate iv.)

I HAVE been during the past four months in constant charge, as Foreman of the Works, of the operations for the restoration of the old building known as Queen Elizabeth's Lodge, carried on by the Epping Forest Committee of the Corporation



QUEEN ELIZABETH'S HUNTING LODGE, IN EPPING FOREST.

From the *Mirror* of May 4th, 1833. Probably representing the condition of the building at that date.

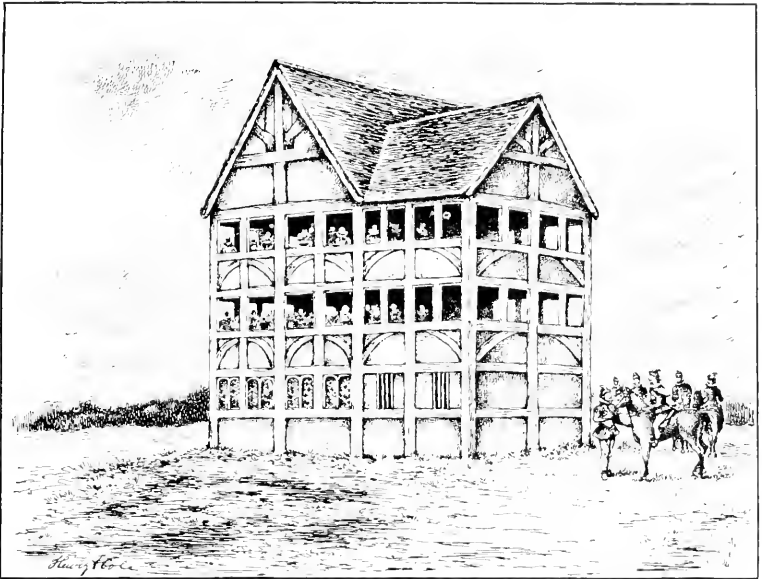
of London, for the purpose of affording more space for the Museum of the Essex Field Club. During this work the whole of the original timbers, which were covered up on the outside with plastering and sham timbers, have been exposed to view. As the opportunities that I have had of tracing the lines of the old timbers have been quite exceptional it may be interesting to relate the observations made and the conclusions drawn therefrom as to the original construction of the building.

I may state at the outset, that in my opinion, based upon actual observation, the Lodge was erected to serve as a kind of "Grand Stand" to view the game, or possibly to witness sports, and *not* as a dwelling house. Of this fact I am as well assured as though I had been foreman of the works during the erection of the building.

The stripping off of the plaster during our recent operations revealed the fact that originally the Lodge had no windows on the staircase, nor any on the first and second floors. The only windows in the building were on the ground floor. Indications were discovered during our work of six original windows on this floor. Three were situate on the west side of the building—one of these being in the position of the west doorway, and one on either side, right and left, of this door. Then there were two windows on the north "return," and one in the position of the present front doorway. Formerly the entrance to the staircase was by a door on the east side, to the left of, and at a right angle to, the present front door. The door frame was of the same size and construction as the frame of the door leading from the staircase to the large room on the first floor.

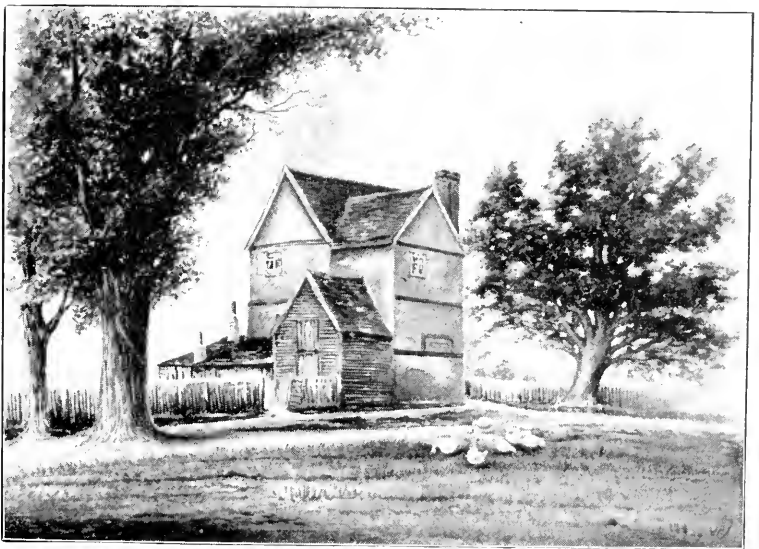
The ground floor at one time consisted of three rooms, the entrance to which must have been on the east side, where the garden is now situate. I could discover no indications of there ever having been a doorway on any other side of the building, nor any evidence of a chimney in the position of the present one; this chimney, I take it, was a later addition. In the place under the stairs, which has served as a coal-cellar, I discovered in the wall-sill on the west side, five holes, seven-eighths of an inch in diameter, and about three inches apart, which probably at one time contained iron bars. Also a number of holes about the same size and at the same distances apart, on the ground-sill at the front, and lower end of, the square shaft into which the stairs are framed. This would have converted the bottom of the square shaft into a kind of cage or "lock-up," the use of which can only be conjectured.

As I have above stated, the first and second floors were in my opinion built as open platforms or stands, whence an extensive view could be obtained in every direction. Readers of the *ESSEX NATURALIST* will remember Mr. W. C. Waller's interesting paper on "Two Forest Lodges" (vol. vii., pp. 82-86). In this he prints a report, dated June 23rd, 1589, on a survey made on two of Her Majesty's houses in Waltham Forest. One of



Ideal sketch of the Lodge in its possible state as a "Grand Stand," previous to its transformation into a dwelling-house.

Drawn by H. A. Cole.

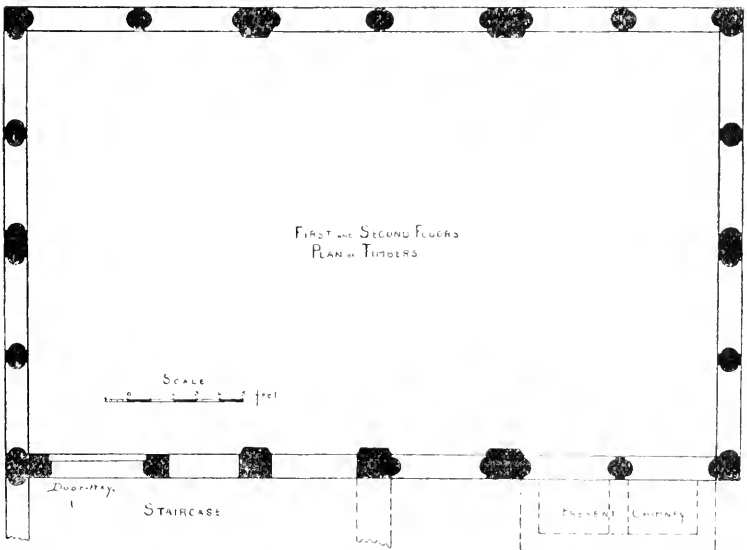


QUEEN ELIZABETH'S LODGE, EPPING FOREST. PREVIOUS TO THE FIRST RESTORATION IN 1879.

From a Water-colour sketch by H. A. Cole.

these is called "Greate Standinge" on "Dannett's Hill" and is identified by Mr. Waller with Queen Elizabeth's Lodge. The document is imperfect, but the description of the building very closely corresponds with my idea of its original state, gained from actual observation before I knew of the existence of Mr. Waller's article (it should be remembered that in this document the ground floor is called the first floor and so on) :—

"The great [lo]dg upon Dannett Hill being built . . . cheife roomes or Stories in height. The first whereof serving for necessarie Uses. The second . . . for convenient standing to view the game (?). The Th[ird] serveth likewise for convenient standing to view the game (?). . . . And the height Is f"



QUEEN ELIZABETH'S LODGE. PLAN OF THE MAIN UPRIGHT TIMBERS.
 For explanations see text Drawn by W. W. Lowe.

I have drawn a birds-eye view plan showing section of the upright timbers as exposed during the work of restoration. All the moulded square spaces, at the present window levels on both first and second floors, which are now filled in with windows and lath-and-plaster panels, were evidently originally wholly open to the weather. It will be seen from the plan that the timbers are moulded on the outside in entire correspondence with the mouldings on the inside, although afterwards covered over with lath and plaster, as shown in old drawings of the building. I imagine that the open spaces were filled in with lath-and-plaster subse-

quent to the date of the repairs alluded to in Mr. Waller's document, and I think that this is proved by the very different nature of the plaster in these spaces, compared with some of the old plastering which we uncovered in the inner parts of the building. I have left with Mr. Cole samples of both these plasterings. The older sample was taken from the spaces under the windows on the inside of the building on the first floor. Some of the oak laths were so old that they fell to dust on being removed, while the plaster was made of loam and lime, mixed with hair, most of which appears to be human hair. In Mr. Waller's document it is reported that the "Walles and about the howse to be plastered mended with" and in the quantities are "Lyme 3 loades" and "Lome 3 loades." As an experiment, I made up a specimen of plastering with equal quantities of forest earth and lime, and in colour and consistency it is very like the old sample.¹ The newer plastering of the spaces subsequently filled in is of a very different kind, composed of lime and hair of oxen. This lime and hair plastering I suppose to be of much more recent date than the other.

The present chimney, as I stated at the beginning of these notes, is certainly not original. Clear indications were found in the first floor room of there having been open spaces between the upright timbers in front of which the chimney now stands; for example, the mortise holes for the horizontal and vertical timbers still remain. I think that this chimney was built at the time the other open spaces between the timbers were filled in, and the "convenient standings" were transformed into the two rooms as we now know them.

The fireplace at the reparation of the Lodge some time subsequent to the date of Mr. Waller's document (the 31st year of Elizabeth, 1589) was probably outside the building, and was perhaps that structure referred to as the "chimney of lome" with oven in the report. We have found no trace of a chimney in connection with the original building.

Finally it should be observed that the joists upon which the flooring was laid were so framed as to throw the flooring highest in the middle of the room, an arrangement perhaps connected with the necessity of draining out rainfall at the time the sides of the "Standinge" were open to the weather.

1. It may be worth noting that in the quantities, an imperfect word occurs: "eare liij, bushel." Is it possible that this refers to the *hair* employed?—Ed.

[We have given a few pictures of the old Lodge in the text and in Plate IV., which will serve to illustrate some points in this very interesting paper of Mr. Love's. On reading Mr. Waller's document, one remarks that in the description of the second "house or keeper's lodge" at High Beach it is said to be "built of tymbur but after the ordinary manner" (E.N. vii., page 84). Can these words be taken to indicate that the "Greate Standinge" on Dannett's Hill was not built after the ordinary manner, but was of an exceptional character?

We shall be very glad to know from architects or students of old buildings, whether any structure analogous to the Lodge in its original state is known to exist. As at present advised, the "Greate Standinge" appears to be unique.—ED.

SOME NEW SECTIONS IN, AND CONTRIBUTIONS TO THE FAUNA OF, THE RIVER DRIFT OF THE UPHALL ESTATE, ILFORD, ESSEX.

By J. P. JOHNSON and G. WHITE.

EVER since the days of the Uphall brickyard where Sir Antonio Brady obtained the magnificent series of mammalian remains which now occupies so prominent a position in our National Collection, the small remnant of those remarkably fossiliferous beds of gravel, sand, and loam, have been hidden from the geologist. It is true there was formerly a small pit, about eight feet in width and nearly twice that in depth, sunk in a corner of the famous brickfield itself, but as this was half filled with timber and as it was practically unfossiliferous (a fragment of bone was the reward of a whole afternoon's search) it could not by any means be regarded as a representative section. Towards the end of July, 1899, one of us had occasion to visit the district on business and was delighted to find that this pit, which is situated on the west side of Ilford (or Barking) Lane had been enlarged and that another had been opened close by, to supply building materials for the houses now being erected on the classical site. A few enquiries amongst the men at work in the first mentioned pit elicited the information that they had come across several bones during the process of excavation; and they produced among other things a complete left ramus of *Rhinoceros leptorhinus*. The section showed a fossiliferous bed of sand, four feet in thickness, passing down

into River Gravel with shells in the upper part, and overlaid by made ground. Several imperfect examples of *Corbicula fluminalis* and *Helix nemoralis* were obtained from the sand, together with an abnormal specimen of *Helicella itala*—a new record from Ilford. The adjacent pit showed a similar section which did not however, at that time, yield any shells, these being very irregularly distributed throughout the deposit.

Since the above visit we have systematically collected from these sections and have been rewarded with several finds of great interest.

The following is a complete list of the Mollusca we have obtained:—

- Agriolimax agrestis*, Linn
Vitrea crystallina, Müll.
V. nitida, Müll.
Arion ater, Linn.
Punctum pygmaeum, Drap.
Pyramidula rotundata, Müll.
Eulota fruticum, Müll.
Helicella itala, Linn. var.
 „ *caeperata*, Mont.
Vallonia pulchella, Müll.
Helix hortensis, Müll.
 „ *nemoralis*, Linn.
Puſa muscorum, Linn.
Vertigo anti-vertigo, Drap.
Clausilia laminata, Mont.
C. bilentata, Ström.
Cochlicopa lubrica, Müll.
Carychium minimum, Müll.
Succinea elegans, Risso.
Ancylus fluviatilis, Müll.
Limnaea pereger, Müll.
L. auricularia, Linn.
L. palustris, Müll.
L. truncatula, Müll.
Planorbis marginatus, Drap.
P. glaber, Jeffr.
P. spirorbis, Müll.
Valvata piscinalis, Müll
V. cristata, Müll.
Bithynia tentaculata, Linn.

Paludestrina marginata, Mich.
P. ventrosa, Mont.
Unio tumiclus, Retz.
Corbicula fluminalis, Müll.
Sphaerium mainanum, Kobelt.
Pisidium amnicum, Müll.
P. fontinale, Drap.

Fifteen of these are new records from the Uphall beds—viz., *Agriolimax agrestis*, *Vitrea crystallina*, *Arion ater*, *Punctum pygmaeum*, *Pyramidula rotundata*, *Helicella itala*, *Helix hortensis*, *Clausilia laminata*, *C. bidentata*, *Planorbis glaber*, *P. spirorbis*, *Valvata cristata*, *Paludestrina ventrosa*, *P. marginata*, and *Sphaerium mainanum*; whilst we have been able to verify four records of which no specimens were known, namely, *Pupa muscorum*, *Vertigo anti-vertigo*, *Carychium minimum*, and *Ancylus fluviatilis*.

The commonest shells are those of *Corbicula fluminalis* and *Helix nemoralis*. The latter are mostly 5-banded. Several have all the bands merged whilst we obtained one 3-, two 4-, and a couple of 6-banded specimens.

Arion ater is entirely new to the Pleistocene, and *Helix hortensis* to the Thames Basin Brickearths. As the former is represented by a single granule and as the latter is not easily distinguishable, in a fossil state, from *Helix nemoralis*, we submitted them to Messrs. A. S. Kennard, and B. B. Woodward, who consider the identification to be correct.

Enlota fruticum, *Paludestrina marginata*, *Corbicula fluminalis* and *Sphaerium mainanum* are all extinct in Britain, though still living elsewhere.

The specimens of *Helicella itala* differ considerably from the existing forms and are identical with the only other known specimen from the Thames Valley Drift, viz., the one which Mr. L. W. J. Abbott obtained from the cutting at West Thurrock¹ and which is now in the British Museum (Natural History).

Mr. Martin A. C. Hinton whose recent paper on the "Pleistocene Deposits of the Ilford and Wanstead District"² should be read in connection with this, has kindly gone through our Mammalian remains, and has recognised, among other

¹ See A. S. Kennard and B. B. Woodward. "Post-Pliocene Non-Marine Mollusca of Essex." *ESSEX NATURALIST*, vol. x. (1897), p. 87-109.

² *Proceedings Geologists' Assoc.*, Vol. xvi., part for Feb., 1900 (in the press). See abstract of this paper, by the author, with some further observations, in the present part of the *ESSEX NATURALIST*, *post.*—ED.

things, teeth of *Bos primigenius* (Boj.), *Rhinoceros megarhinus* (Christol), and *Microtus gregalis?* (Pallas). With reference to the last mentioned he writes, "A second upper molar of a small Vole corresponds very closely with that of *Microtus gregalis* in respect to the pattern of its prisms and also in size. It is just possible, however, that this specimen belongs to *Microtus ratticeps* and since it is somewhat damaged, lacking a prism, it is certainly more desirable to make a provisional, rather than an absolute, reference to *Microtus gregalis*. Whether it belongs to one or the other it is an important addition to our list of small vertebrates from Ilford. The Voles from the Pleistocene deposits of Ilford are now represented by five specimens indicating three species, viz., *Microtus amphibius* from the Uphall pits (Cotton Coll.) and the Cauliflower Brickyard (a right upper molar in my collection). *Microtus arvalis* or *agrestis*, from the Cauliflower brickyard, in my collection. *Microtus gregalis?* from Uphall." We also obtained a few worked flints.

A small rounded boulder of greywether sandstone was exhumed from the gravel.

Besides these two fossiliferous sections there are several on the east of Ilford Lane, which have not yet yielded any organic remains, but which are of special interest as they show in addition the "trail." We measured the best of these which was as follows:—

	Surface soil	..	...	2ft.
(1)	Contorted Drift (Trail)		...	4-5½
(2)	Sand	...	..	nothing to 3
(3)	Gravel	...	...	1-9
(4)	Sand	...	...	1
(5)	Gravel	...	...	4
(6)	Sand and gravel	...	..	4½ feet shown.

A few lenticular patches of manganese dioxide are exposed in this section.

December, 1899.

P.S.—Since writing the above we have obtained another addition to the fossil invertebrate fauna of Ilford, viz., *Planorbis nautilus* (Linn.) We are also able to confirm the occurrence of *Succinea oblonga* (Drap.), a mollusc which, being confined to a more northern tract, is no longer living in Essex.

“ON THE PLEISTOCENE DEPOSITS OF THE
ILFORD AND WANSTEAD DISTRICT, ESSEX.”

IN 1899 I read a paper, before the Geologists' Association of London,¹ on the Ilford and Wanstead district. Since the reading of that paper, some further sections of the Pleistocene deposits have been exposed at those places and since they are of some interest they form part of the subject of the present paper. In the paper above mentioned, I dealt with the subject under two headings, viz., (1) High Terrace Drift and (2) Lower or Middle Terrace Drift.

A description of the large patch of High Terrace Drift which occurs at Wanstead was given; this description included details of a remarkable section of contorted gravels which was exposed early in 1898 at a pit to the north-west of Wanstead Park. The importance of this section is obvious when it is mentioned that the contorted drift was capped with genuine, *in situ* Pleistocene gravel, which thus proved the antiquity of the disturbance. I ascribed the disturbances to the grounding of river ice.

Mention was made of the occurrence of *Equus caballus* in the gravel here. The occurrence of seams of Manganese was also noted and in connection with this I made many observations in the Wanstead pit on the origin of the seams. My conclusions were published in a paper in *Science Gossip*,² in which it was contended that the Manganese seams did not owe their origin to filtration from the surface, but to fluvial deposition contemporaneous with the deposition of the gravels.

Further sections of the gravel in this pit have afforded me many examples of contortion. Sometimes the seams of sand and gravel are so twisted up as to resemble loose knots.

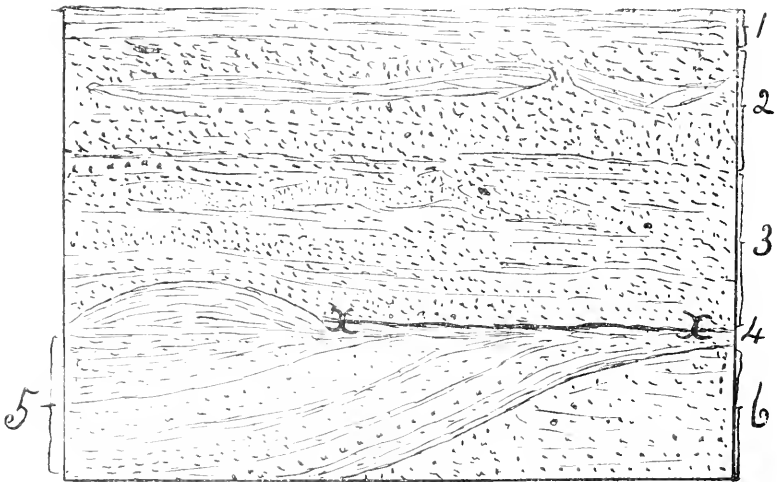
One section is worthy of being given in detail here. The beds seen were as follows:—

- | | |
|---|------|
| (1) Surface soil and made earth ... | 2ft. |
| (2) Gravel, with lenticular patches
of sand, one of which had its
top and bottom layers
cemented into 'iron-pan' ... | 4ft. |

¹ MARTIN A. C. HINTON.—“The Pleistocene Deposits of the Ilford and Wanstead District,” *Proc. Geol. Assoc.* Vol. lvi., part for Feb. 1900.

² MARTIN A. C. HINTON.—“Manganese in River Gravels,” *Science Gossip*, vol. vi., N.S., pp. 146-147

- | | | |
|-----|---|-----------|
| (3) | Sandy gravel, with shingle beds, slightly stained with manganese in places ... | 6ft. |
| (4) | Sand, the upper part of which was 'iron-pan' and with a continuous seam of Manganese at X in the section (Fig. 1) . . | 1-2ft. |
| (5) | Layers of sand and small pebbles filling hollow in next | 5ft. 6in. |
| (6) | Gravel, with lenticular patch of sand, up to | 5ft. |
- London Clay with water.



SKETCH SECTION OF EXPOSURE IN PIT N.W. OF WANSTEAD PARK

For explanations see text.

As will be seen by reference to Fig. 1, the beds numbered 5 occupy a channel which has been cut out of bed 6. The direction of the axis of this channel is from west to east, a direction which is approximately coincident with that of the Thames. There can be no doubt that this ancient channel was eroded by an under-current of the Pleistocene river.

In the paper before referred to¹ an account of the High Terrace Drift of Barkingside was given in which I recorded the occurrence of *Bos primigenius*? or *Bison friscus*? and *Equus caballus*.

Both here and at Wanstead I have obtained many Palæolithic implements (chiefly flake tools) from the High Terrace Drift.

As to the foreign boulders of the High Terrace Gravels the occurrence of quartzites, Triassic sandstones, sarsens, gneiss, Carboniferous chert, and mica schist was mentioned. Many of these boulders are of considerable size and it was suggested that they might have been carried by river ice. Recently I obtained four large fragments of chalk *in situ* in this gravel at Wanstead.

MIDDLE TERRACE DRIFT.

In 1899, the excavations for the sewers of the new roads, which have been cut through the fields which lie between Wanstead Flats and Wanstead Park showed gravel and sand generally of about 20 feet in thickness overlying the London Clay. From these sections I have obtained many Palæolithic implements, a fair proportion of which have been derived from the High Terrace Drift. Near the south-east corner of Wanstead Park the river Roding has cut into the Middle Terrace gravels, a small natural section of which is there exposed.

Great Ilford.

A full description of the sections which have been exposed in the Cauliflower Brickyard during the past few years is given in the Geologists' Association paper. At this place, the brickearths are well seen and numerous fossils have been obtained from the sections. The sections which are cut from west to east, *i.e.*, along the northern face of the brickyard vary greatly in detail, but the north to south exposures present more constant characters. This is what one would naturally expect seeing that whereas the former are cut across what may be termed the strike of the beds, the latter on the other hand are coincident with the dip of the strata. Special attention was given by the author to the contorted drift, which from the evidence noted in the before-mentioned paper, I regard as owing its origin to river-ice which floated down the Thames towards the close of the Palæolithic period. (Two figures of sections of the contorted drift are given).

The more interesting of the palæontological discoveries made by the author at this place are the following :—

A specimen of *Limnæa glabra* was kindly identified for me by Messrs. A. S. Kennard and B. B. Woodward, F.L.S. This

species is for the first time recorded in a fossil state in this country and thus takes its place as a member of the Pleistocene fauna.

A portion of a femur and a small right second upper molar of *Microtus* were submitted to Mr. E. T. Newton, F.R.S., who identified them as belonging to *M. arvalis*? and *M. amphibius* respectively. *M. arvalis*? is a new record for Ilford, while *M. amphibius* is also known from the old Uphall sections.

The most important new sections of the Ilford brickearths are described by Mr. J. P. Johnson in the present issue of the "ESSEX NATURALIST." I visited these sections in his company and I agree with him in his conclusions.

East of Seven Kings' Water on the northern side of the High Road is situated a ballast pit, belonging to the Great Eastern Railway at a height of 60 feet O.D. This pit was visited by the Geologists' Association during their excursion to Ilford on May 13th, 1899. My notes, judging from the report, on that occasion seem to have been a little more voluminous than those of the director of the excursion.³ The following is the section exposed as noted by me.

1. Loam, with a seam stained with Manganese at the base, and one or two pebble bands in the middle part, about 3 to 6 feet.
2. Gravel, very evenly stratified, with two beds, a few inches thick, of white quartz sand in one place, and occasional lenticular patches of sand. The stones were, for the most part, small pebbles of flint and quartz. Several clay ironstones were observed in the gravel, which had been oxidised and converted into ochre. The thickness of the gravel shown was about 18 feet with water occurring at its base.

CONCLUSIONS.

From the evidence afforded by the High Terrace Drift the author has come to the conclusion that this series, and probably some of the older members of the Middle Terrace gravels represent a time during which the climate was severe enough for the Thames to be periodically frozen over. (Of course, if only the higher reaches of the river were frozen over, this would be

³ T. V. HOLMES.—"Report on Excursion to Ilford," *Proc. Geol. Assoc.*, vol. xvi., p. 161. Reprinted in *ESSEX NATURALIST* ante pp. 149-151.

sufficient to provide ice-rafts). This conclusion appears to be the only one open to the field geologist, and to a certain extent it is supported by the palæontological evidence.

In my opinion, however, the Middle Terrace drift as a whole (including the brickearths) shows a very different state of things in climatic conditions. I have argued in my paper that whether we view this group of the Palæolithic deposits from a lithological or from a palæontological standpoint, we have to regard it as representing a period of comparative equability, probably similar to that obtaining in these islands at the present day.

A point of interest with regard to the physical geography of the brickearth period is dealt with. From the occurrence of *Scrobicularia piperata* at Ilford, of *Paludestrina ventrosa* at Crayford, Grays, and Ilford, and of *Littorina rudis* at Crayford in the Middle Terrace brickearths of those places it is argued that the Thames whatever it may have been in earlier or later parts of the Pleistocene epoch could hardly have been then a tributary of the Rhine. On the contrary it must have then possessed an estuary of its own, probably situated not very far to the east of that of the present day. The upper beds of the Middle Terrace drift show similar contortions to those observed in the High Terrace series. The conclusion to be drawn is then obvious, viz., that they have been contorted by river ice. From this it would appear that comparatively severe conditions came on once more towards the close of the Palæolithic period.

The following tabular statement of the Pleistocene deposits of the Thames is given in the conclusion of the Geologists' Association paper :—

1. High Terrace Drift	}	Older Palæolithic. Cold period.
2. Middle Terrace Gravels (in part)		
3. Middle Terrace Gravels (in part) & Brickearths	}	Newer Palæolithic. Genial period.
4. Trail (Contorted Drift series)		
	)	Close of Palæolithic Period. Cold period.

A list of the more important papers and works relating to the Pleistocene deposits of the Ilford district is appended to the paper.

MARTIN A. C. HINTON.

January 27th, 1900.

ESSEX FIELD CLUB'S "FUNGUS FORAY," 1899.

By GEORGE MASSEE, F.L.S., *Principal Assistant, Royal Herbarium, Kew; President of the British Mycological Society.*

IN the majority of instances, Mycological students commence by first paying attention to the toadstools or Agarics, or other large examples of fungal life; and the comparative absence of young aspirants to a knowledge of the subject may in part be explained by the fact that the class of fungi indicated above have, for some as yet unexplained reason, been, for the last few years, comparatively speaking, absent from their accustomed haunts.

Doubtless, the idea will occur to many (if the subject is considered worthy of bestowing a thought upon) that comparative drought is the cause of the absence of fungi, and this is, undoubtedly, one factor that determines the relative abundance of fungi, but it is not the only one.

During those favourable seasons, when fungi are most abundant in numbers, it is a fact well known to every field mycologist that, even the same district, white-spored Agarics sometimes predominate to a very large extent, whereas, another season, rusty-spored species are well to the front, and white-spored species are rare. Again, during some seasons, the species of *Boletus* are numerous, whereas on other occasions, representatives of the genus are rare, or entirely absent, although to an ordinary observer climatic conditions were equally favourable during the two seasons. In 1894, *Coprinus comatus* occurred in immense numbers throughout the late summer and autumn, on a piece of waste ground by the river between Kew and Mortlake; this autumn the crop is again equal to that of 1894, but during the intervening four years, not a dozen specimens were observed. It can scarcely be suggested that a crop is produced by the mycelium of this fungus only once in five years, and is further negated by the fact that on certain occasions we have an abundance of individuals produced for several years in succession. At present it may be stated, without qualification, that we are absolutely ignorant as to the combination of conditions necessary to determine the growth in profusion of different species of fungi. Something might be done by those residing in the neighbourhood of Epping Forest, and as the observations, to be of any real value, would have to extend over several—even many—years, the commencement should not be delayed.

Take three species common in the Forest—*Amanita muscaria*, *Armillaria mellea*, and *Boletus scaber*—each of which recurs in a given locality, when, for want of a more exact term, we may say conditions are favourable. Having selected a site where the fungus is present in abundance, take monthly, or, still better, fortnightly measurements of the temperature of the soil at a depth of six inches below the surface; humidity of the soil—if possible, the proportion of humic acid in the soil—also general atmospheric conditions as to temperature and moisture.

If the above suggestions could be followed out for, say, ten years, supplemented, as a matter of course, by the relative annual crop of fungi growing within the experimental area, some inkling, at least, of certain of the conditions that collectively determine the presence or absence of different species of fungi would be arrived at; such would rank as pioneer work on a subject where everything has yet to be done, and which will be done some day; hence, why not by members of the Essex Field Club?

Returning to the subject of the Foray, a pleasing feature—as a set-off to what has been stated above—was the presence of members who promise to become important auxiliaries to the already-existing band of mycologists who yearly explore the Forest; but why the Forest always, or nearly so? The body inaugurating the foray is the Essex Field Club, and not the Epping Forest Club, as some members residing in other parts of Essex might be led to imagine.

The display of fungi on the tables was the best that has been seen for many years. Altogether, 134 species were collected, including such rarities as *Tricholoma acerba*, *Collybia fodiens*, *C. bibulosa*, *Nolanea pisciodora*, and *Torula ovalispora*. The presence of the veteran Mycologist, Dr. M. C. Cooke, was a source of pleasure, combined with instruction, to everyone.

Finally, we have in Great Britain just over five thousand species of fungi; of these about one thousand are Agarics or gill-bearing species, mostly appearing during the autumn months, and considered by the majority of people as constituting the whole of our Fungus flora. For this reason, probably, fungus forays are always held in the autumn, when the larger forms are presumed to be present: the result is that the list of species enumerated by those societies that countenance a foray is rich in Agarics and allied forms, but miserably defective in the remain-

ing groups, the members of which happen to mature during the spring and summer. Such a list indicates at a glance the fact that the Society in question is not interested in fungi from a scientific standpoint, but simply repeats annually, in an automatic manner, a custom which originated by chance rather than design. The remedy for this state of affairs is obvious.

[At our request, Mr. Masee has added a short list and analyses of works suitable for the student, which our members may find useful.

The following books deal exhaustively with different groups of Micro-fungi. All are illustrated:—

A Monograph of the British Uredineæ and Ustilagineæ. C. B. Plowright-Kegan, Paul, French & Co. 8s. 6d. This book deals with the life-history and classification of those destructive parasites popularly known as producing "Rust," "Smut," "Bunt," &c., on cereals and other cultivated and wild plants.

British Fungi: Phycomycetes and Ustilagineæ. G. Masee. Lovell Reeve & Co. 7s. 6d. Contains a general introduction to the study of Fungi, and descriptions of all British species included under the two families mentioned.

British Fungus-Flora. G. Masee. George Bell & Sons. Four volumes, 7s. 6d. per volume. Vol. III. contains the Hyphomycetes, popularly known as "Moulds" and "Mildews." The species are minute, but exceptionally beautiful as microscopical objects. Vol. IV. is devoted to the Discomycetes, a group including the fungi known under the general names "Peziza," "Morel," &c. The species are abundant, very beautiful in form and colour, and from a biological stand-point they are exceedingly interesting.

To these may be added the following, which will be most useful to those wishing to take up the study from an economical point of view, so necessary to farmers, gardeners and foresters:—

A Text-book of Plant Diseases caused by Cryptogamic Parasites. G. Masee, Duckworth & Co. 5s. nett. This is a hand-book of plant diseases, not too technical, with descriptions of the most approved curative and preventiv methods.

Diseases of Field and Garden Crops, chiefly such as are caused by Fungi. Worthington G. Smith. Macmillan. 4s. 6d.

Text-book of the Diseases of Trees. Dr. Hartig. Translated by Prof. Somerville. Macmillan.

Timber and some of its Diseases. Prof. Marshall Ward. Macmillan. 6s.

We know that our thoughtful members will accept Mr. Masee's criticism of our annual "Fungus Meetings" as being in a large sense deserved. We have long felt the unsatisfying nature of the occupation which consists in picking up an *Agaric*, greeting it with a learned name, and then throwing it away! The neglect of the smaller—but, to a biologist, the more interesting minute forms—is also a sad feature, which should no longer be allowed to disfigure our Cryptogamic assemblies. But it should be remembered that our Club is not especially a Mycological Society, and we may plead, in arrest of judgment, that the Fungus Flora of Epping Forest was practically unknown until our "Forays" began, 19 years ago, to afford materials for the lists of the

Hymenomycetes which have appeared in the ESSEX NATURALIST. We are sure that if any member—or better, a group of members—will adopt Mr. Massee's admirable suggestion with regard to the systematic observation of the larger fungi, the Council and officers will give all the facilities in the power of the Club to afford, and the work-room at the new Essex Museum may be used for analyses, &c. But how comes it, considering the fact that the larger fungi have been "foraged," illustrated, and described in Britain for 30 or 40 years, that so little has been attempted by Mycologists beyond fitting each form with a more or less stable name? Entomologists have come in for some hard knocks from time to time; but the humble collector has, at least, aided in ascertaining the life-histories of some hundreds, or even thousands, of British insects. One of our leading Mycologists, in the above article, confesses that a group of most important factors affecting the life-history of an *Agaric* are absolutely unknown. Mycologists must evidently bestir themselves.—ED.]

HISTORY OF ESSEX BOTANY.

By Prof. G. S. BOULGER, F.L.S., F.G.S., *Vice President*.

PART I (*continued from page 68*).

THE BOTANISTS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

THE following passage should have appeared after that relating to *Lunaria* on p. 68.

p. 391. "*Conyza major*. Great Fleawort. *Conyza minor*. Fleabane Mullet. . . . The great and lesser *Conyza* do growe . . . at Grays in Essex."

Johnson (Ger. em., p. 481) re-writes the whole of this chapter of Gerard and says that the plant "which grows in Kent and Essex on chalkie hills" is *Baccharis Monspeliensium* of Lobel, or *Conyza maior* of Matthioli, otherwise Plowman's Spikenard, our *Inula conyza* DC. He then, on pp. 482-3, figures and describes as common, "*Conyza media*, Herbe Christopher," which is *Pulicaria dysenterica* Gaertn., and as occurring "in like places" *Conyza minima* of Lobel and Dodoens, the *C. minor* of Tragus, which is *Pulicaria vulgaris* Gaertn. There is little doubt from the habitat and synonymy that he gives that Gerard had confused the first two species, but all three of them occur in the county and may well have occurred at Grays.

p. 448. "*Glaux exigua maritima*. Blacke Saltwoort . . . I found it especially . . . by Tilbery Block-house in Essex." [*Glaux maritima* L.]

p. 501. "*Veronica femina Fuchsi*, sive *Elatine*. The Female Fluellen, *Elatine altera*. Sharpe pointed Fluellen. Both these plants I have found in

sundry places . . . It groweth . . . in sundry places of Essex." [*Linaria spuria* Mill., though the figure does not much resemble that species, and *L. elatina* Mill.]

p. 507. "*Prunella*. Selfe-heale . . . Prunell or Brunel hath square hairy stalks of a foot high, beset with long, hairy and sharpe pointed leaues, and at the top of the stalks grow floures thicke set together, like an eare or spiky knap, of a browne colour mixed with blew floures, and sometimes white, of which kind I found some plants in Essex neere Henningham castle." [*Prunella vulgaris* L.]

p. 518. "*Gnaphalium marinum*. Sea Cudweed . . . groweth at a place called Merezey, six miles from Colchester, neere vnto the sea side." [*Diotis candidissima* Desf. The first British record.]

p. 568. "*Lamium luteum*. Yellow Archangell . . . in many . . . copses about Lee in Essex. [*Lamium galwobdolon* Crantz. The first British record.]

p. 577. "*Serratula purpurea, sine alba*. Saw-woort with purple, or white floures . . . in sundry places of Essex." [*Serratula tinctoria* L. As Johnson says (Ger. em. p. 713), Gerard "out of *Tabernamontanus* gaue three figures, with as many descriptions of this plant, yet made it onely to vary in the colour of the floures, being either purple, white, or red; but he did not touch the difference which *Tabernamontanus* by his figures exprest," as to the incision of the leaues.]

p. 587. *Morsus Diaboli*. Diuels bit . . . at Lee in Essex, and at Raleigh in Essex, in a wood called Hammerell, and sundrie other places . . . superstitious people hold opinion, that the diuell for enuie that he beareth to mankinde bit it off, because it would be otherwise good for many vses." [*Scabiosa succisa* L.]

p. 646 "*Digitalis alba*. White Fox-gloues . . . by Colchester in Essex." [*Digitalis purpurea* L.]

p. 659. "*Cynoglossum minus folio virente*. Small greene leaued Hounds-tongue . . . groweth very plentifully by the waies side as you ride Colchester highway from Londonward, betweene Esterford and Wittam in Essex." [*Cynoglossum germanicum* Jacq. The first British record. Messrs. Trimen and Dyer erroneously suggest that Petiver's Middlesex list in Gibson's Camden (1695) is the earliest." ²²]

p. 690. "*Soldanella marina*. Sea Binde-weed . . . neere to Lee in Essex, at Mersey in the same countie." [*Calystegia soldanella* R. Br.]

p. 693. "*Saxifraga alba*. White Saxifrage . . . in the greene places by the sea side at Lee in Essex, among the rushes, and in sundrie other places thereabout, and elsewhere." [*Saxifraga granulata* L.]

p. 713. "*Convolvulus minimus spicz-folius* Lauander-leafed Binde-weed . . . This Bindweed *Pena* saith he neuer saw but in the brinks of quicke-sets and Oliuets in Prouence, Sauoy, and Narbone; notwithstanding I found it growing in the corne fields about great Dunmow in Essex, in such abundance, that it doth much hurt vnto their corne. This kind of Bindweed or *Volubilis* is like vnto the small Bindweed before mentioned, but it hath a finer floure, plaited or folded in the compasse of the bell very orderly, especially before the Sun rise (for after it opens it selfe the welts are not so much per-

ceived) and it is of a darke purple colour . . . The leaues are long and narrow, resembling *Linaria* both in colour and hairinesse." [*Convolvulus arvensis* L.?]]

It must be admitted that this description and, still less, the figures that accompany it in Gerard and in Johnson's edition do not quite suggest any British convolvulus. To Gerard's statement, "All these kindes of Bindweeds do grow very plentifully in most parts of England," Johnson adds the qualification (Ger. em. p. 863). "The third and fourth excepted," which may be taken as a denial of their occurrence at all. Parkinson, however, in his *Paradisus terrestris* (1629), p. 359, writes:—"Convolvulus purpureus spicæ folius. Lavender-leafed Bindeweede . . . groweth wilde in the fields, about Dunmowe in Essex," which is repeated by How in his *Phytologia* (p. 31), whilst Parkinson further in his *Theatrum Botanicum*, pp. 171-2, uses the same figure as Johnson and writes:—"3. *Convolvulus spicæ folius*. Lavender leafed Bindeweede. This small bindeweede is as great a plague to the fields, where it naturally groweth as the last; the leaves are long and narrow, resembling Lavender, and the flowers of a deepe purple colour, wherein it differeth from others, for else it is like the last." Merrett in his *Pinax*, p. 29, adopts Gerard's locality and adds "in Tuddington field." This justifies the statement by the authors of the *Flora of Middlesex* (p. 188) that "A very narrow leaved form [of *C. arvensis*] was distinguished by the older observers," and they add a reference to "*C. arvensis minimus* about London" from Buddle's MSS. These old references explain the characteristic note by Newbould in Gibson's *Flora* (p. 206). "The varieties of this plant deserve attention." This plant may well be the *Convolvulus angustissimo folio cum auriculis* of Plukenet, *Almagest*. 116. Tab. 24. fig. 3, and the *Convolvulus arvensis minimus* of Dent in Ray's *Synopsis*, ed. ii., 157, from Harlton, Cambridgeshire, for which C. C. Babington keeps up the varietal name *minimus* in his *Flora of Cambridgeshire*, p. 153.

p. 739. "*Viorna*. The Trauellers Ioy . . . in many places of Essex." [*Clematis vitalba* L.]]

p. 759. "Ruscus, siue Bruscus, Knee-holme, or Butchers broome . . . in diuers places of Kent, Essex, and Barkshire, almost in euery copse and low wood." [*Ruscus aculeatus* L.]]

p. 789. "*Althæa Ibiscus*. Marsh Mallow . . . groweth very plentifully in the marshes both on the Kentish and Essex shore alongst the riuier of Thames, about . . . Tilburie, Lee, Colchester, Harwich, and in most salt marshes about London." [*Althæa officinalis* L. The first British record]]

p. 839. *Pentaphyllum rubrum palustre*. Marsh Cinkfoile . . . groweth in a marrish ground adjoining to the land called Bourne ponds, halfe a mile from Colchester; from whence I brought some plants for my garden, where they flourish and prosper well. [*Potentilla palustris* Scop. The first precisely British record; but this species occurs in Gerard's first Catalogue of his garden, published in 1596.]

p. 896. "*Peucedanum* or Hogs Fennell groweth very plentifully on the South side of a wood belonging to Waltham, at the Nase in Essex by the high-way side." [*Peucedanum officinale* L.]

No doubt Waltham is a mistake for Walton. As Gibson says (*Flora*, p. 139), "Although this remarkable plant has only been noticed here and in a few Kentish stations, Gerard and Ray seem to have been as well acquainted with it as ourselves."

p. 954. "*Asparagus sativus*. Garden Sperage . . . groweth wild in Essex, in a meadow adjoining to a mill, beyond a village called Thorp . . .

Likewise it groweth in great plentie neere vnto Harwich, at a place called Landamar lading." [*Asparagus officinalis* L. This last locality is printed "Bandamar" by Johnson.

p. 966. "*Asperula flore cæruleo*. Blew Woodrooffe . . . in many places of Essex." [*Sherardia arvensis* L.]

p. 971. "*Filix florida, sive Osmunda Regalis*. Water Ferne or Osmund Royall . . . vpon diuers bogges on a heath or common neere vnto Bruntwood in Essex, especially neere vnto a place there that some haue digged, to the end to finde a nest or mine of gold; but the birds were ouer fledge, and flowne away before their wings could be clipped." [*Osmunda regalis* L.]

p. 976. "*Phyllitis multifida*. Finger Harts-tongue . . . I found in the garden of Master Cranwich a Chirurgion dwelling at Much-dunmow in Essex, who gaue me a plant for my garden." [*Scolopendrium vulgare* Symons.]

p. 982. *Filicula petræe femina, sive Chamæfilix marina Anglica*. The female dwarfe stone Ferne . . . groweth vpon the rockie cliffe neere Harwich." [*Asplenium marinum* L.]

It is possible that this species may have existed on the Essex coast in the time of Gerard and have been lost by the wearing away of the cliffs. It is not mentioned in Gibson's *Flora*.

p. 983. "*Ruta muraria, sive Salvia vitæ*. Wall Rue, or Rue Maiden-haire . . . Stone Rue groweth . . . vpon the Church walls of Railey in Essex." [*Asplenium ruta-muraria* L.]

p. 1000. "*Eryngium marinum*. Sea Holly . . . growes by the sea side vpon the baich and stony ground. I found it growing plentifully . . . in Essex at Landamar lading, at Harwich, and vpon Langtree point, on the other side of the water, from whence I haue brought plants for my garden." [*Eryngium maritimum* L.]

p. 1006. "*Dipsacus minor, sive Virga pastoris*. Sheepheards-rod . . . another kinde of Teasell, being a wilde kinde therof, and accounted among these Thistles, growing higher than the rest of his kindes; but his knobbed heads are no bigger than a Nutmeg . . . I found growing in moist places

in the high way leading from Braintree to Henningham castle in Essex, and not in any other place except here and there a plant vpon the highway from Much-Dunmow to London." *Dipsacus filiosus* L.]

p. 1034. "*Melilotus germanica* . . . German Clauer . . . no part of the world doth enioy so great part thereof as England, and especially Essex; for I haue seene betweene Sudbury in Suffolk, and Clare in Essex, and from Clare to Henningham, and from thence to Ouendon, Bulmare, and Pedmarsh, very many acres of earable pasture overgrowne with the same; insomuch that it doth not onely spoyle their land, but the corne also, as Cockle or Darnel, and as a weed that generally spreadeth ouer that corner of the Shire." [*Melilotus officinalis* Lam. or possibly *M. arvensis* Willd. in part. Not so troublesome now-a-days.]

p. 1057. *Hedysarum Glycyrrhizatum*. Liquorice hatchet Fetch . . . in Essex about Dunmow, and in the townes called Clare and Henningham." [*Astragalus glycyphyllos* L.] Johnson (Ger. em. p. 1236) adds:—"Also it growes by Purfleet, about the foot of the hill whereon the Wind-mill stands."

p. 1088. "*Rosa Pimpinellæ folio*. The Pimpinell Rose . . . groweth very plentifully in a field as you go from a village in Essex, called Graies (vpon the brinke of the riuer Thames) vnto Horndon on the hill, insomuch that the field is full fraught therewith all ouer." [*Rosa spinosissima* L. The first British record.]

p. 1299. "*Tilia femina*. The female Line tree or Linden tree . . . seemeth to be a kinde of Elme, and the people of Essex about Henningham (wheras great plenty groweth by the way sides) do call it broad leafed Elme . . . neere Colchester, and in many places amongst the high way leading from London to Henningham, in the countie of Essex." [*Tilia platyphyllos* Scop. *Vide supra* pp. 59-60.]

p. 1302. "*Populus alba*. The white Poplar tree . . . in Essex at a place called Ouenden." *Populus alba* L. The first British record.]

There is no work of importance containing any reference to Essex botany between Gerard's *Herball* and the 'emaculate' edition of it published by Thomas Johnson in 1633, of which there is a copy in the Club's library.

Of William Coys, of Stubbers, in the parish of North Ockington (now written Ockendon), in this county, we unfortunately know but very little. He had a garden, which both Lobel and Gerard state to have been richly stored with exotics, and in which the *Yucca gloriosa* first flowered in England in the year 1604.²³ Johnson, in the Appendix to his edition of Gerard, speaks of various exotics received by Coys from Guillaume Boel, a native of the Low Countries, and Parkinson records (*Theatrum*, pp. 83-4) that he found '*Matricaria bullatis floribus aureis*, Naked Featherfew,' probably a rayless form of *Matricaria inodora* L., in Essex.

²³ Pena and Lobel, *Adversaria*. i., 501; ii., 471.

Of Thomas Johnson there is a tolerably full account in the *Flora of Middlesex* (pp. 370-2) and a biography, by the present writer, in the *Dictionary of National Biography* (vol. xxx., p. 47). He was born at Selby, Yorkshire, lived at one time in Lincolnshire, and practised as an apothecary on Snow Hill. In 1595 he seems to have published *Cornucopiæ or divers secrets* (London, pp. 46); and in 1629, *Iter Plantarum Investigationis ergo susceptum . . . in Agrum Cantianum*, the first account of a botanical excursion printed in England, with *Ericetum Hamstedianum*, an account of a herborization on Hampstead Heath, as an appendix. In 1630 he issued *A new Booke of new Conceits* (London, pp. 24)²⁴; in 1632, *Enumeratio Plantarum in Ericeto Hampstediano* (p. 7), the earliest English Florula; and in 1633, as the result, *mirabile dictu*, of only a year's work,²⁵ his "very much enlarged and amended" edition of Gerard. This contained some 800 additional plants and 700 new figures, making in all, according to Pulteney, 2850 descriptions and 2717 figures; whilst the much needed corrections of Gerard's blunders are at least as valuable as the additions. The editor's additions are generally, but unfortunately not always, marked with ††; and yet many modern writers quote all alike as "Gerarde." The *Herball* was reprinted, without further alteration, in 1636. Meanwhile in 1634 Johnson published *Mercurius Botanicus* (London, pp. 78), a description of a twelve days' tour in the south-west of England, with an appendix *De Thermiss Bathonicis*. This was followed, in 1641, by *Mercurii Botanici Pars altera* (London, pp. 37) describing a tour in Wales.²⁶ As a royalist, Johnson, in 1642, was made Bachelor of Physic by the University of Oxford and became M.D. in the following year, in which he published a translation of the medical works of Ambroise Paré. At the siege of Basing House, Johnson became lieutenant-colonel under Sir Marmaduke Rawdon, fired the Grange near by, killing three hundred of Waller's men, wounding five hundred more, and capturing stores; but was shot in the shoulder on September 14th, 1644, during a sally, and died a fortnight later. "being then no less eminent in the garrison for his valour and conduct as a soldier, than famous through the kingdom for his excellency as a herbalist and physician."²⁷

²⁴ British Museum press mark 1036. b. 33. Reprinted by Halliwell in his *Literature of the 16th and 17th centuries*, 1851. These two opuscula are not mentioned in the *Dictionary of National Biography*.

²⁵ Vide *Appendix to the Herball*: Preface, p. 1591.

²⁶ Having become very scarce, the smaller botanical works of Johnson were reprinted in 1847 by T. S. Ralph, under the title of *Opuscula omnia botanica Thomæ Johnsoni*; but the reprint is now scarce.

²⁷ Antony a Wood.

To Johnson's work we seem to owe the addition of only six species to our Essex list, for one of which he is only indirectly to be credited. They are

<i>Damasonium alisma</i> Mill.	<i>Galeopsis angustifolia</i> Ehr.
<i>Linum catharticum</i> L.	<i>Apium graveolens</i> L.
<i>Anagallis cærulea</i> Schreb.	<i>Trifolium fragiferum</i> L.

The records run as follows:—

p. 418. "*Plantago aquatica minor stellata*. Starry headed small Water Plantaine I found . . . a little beyond Ilford, in the way to Rumford." [*Damasonium alisma* Miller. The first British record.]

p. 559. "*Linum sylvestre catharticum*. Mil-mountaine. my friend Mr. John Goodyer told me he had long knowne the plant, and hath sent me this historie of it, which you shall haue as I receiued it from him It groweth on Purfleet hills in Essex." [*Linum catharticum* L.]

p. 618. "*Anagallis femina*. Female Pimpernell differeth not from the male in any one point but in the colour of the floures; for this plant bringeth forth floures of a most perfect blew colour I also being in Essex in the company of my kind friend Mr. Nathaniel Wright found this among the corne at Wrightsbridge, being the seate of Mr. John Wright his brother." [*Anagallis cærulea* Schreb.]

p. 699. "There is another plant that growes frequently in the Corne fields of Kent, and by Purfleet in Essex *Camerarius* calls it *Sideritis arvensis flore rubro* and in the *Historia Lugd.* it is named *Tetrahit angustifolium*, and thought to be *Ladanium segetum* of *Pliny*, mentioned *lib. 29, cap. 8* and *lib. 26, cap. 11*. It hath a stalke some foot or better high, set with sharp pointed longish leaues, hauing two or three nickes on their sides, and growing by couples; at the top of the branches, and also the maine stalks it selfe, stand in one or two roundles faire red hooded floures: the root is small and fibrous, dying every yeare when it hath perfected the seed. It floures in July and August. This is also sometimes found with a white floure." [*Galeopsis angustifolia* Ehr. ?]

This form, the *G. canescens* of Schultz seems more frequent than the *G. intermedium* Vill.

p. 1014. "*Eleoselinum, siue Paludapium*. Smallage. It growes wilde abundantly vpon the bankes in the salt marshes of Kent and Essex." [*Apium graveolens* L.]

p. 1208. "*Trifolium fragiferum*. Straw-berry Trefoile growes in most salt marshes, as in those below Purfleet." [*Trifolium fragiferum* L.]

Of John Goodyer, to whom we owe the record of *Linum catharticum*, we know but little. Johnson in his address 'To the Reader' says "In the first place let me remember the onely Assistant I had in this Worke, which was Mr. John Goodyer of Maple-Durham in Hampshire, from whom I received many accurate descriptions, and some other observations concerning

plants." He is also frequently mentioned in Parkinson's *Theatrum*. Ashmole in his Diary for October 9th, 1651, writes "My Father Backhouse and I went to see Mr. Goodier, the great Botanist, at Petersfield." Robert Brown justly honoured Goodyer by naming after him the orchidaceous genus *Goodyera*.

The next work to Johnson's *Herball* which contains any important Essex records is the *Theatrum Botanicum* of John Parkinson, published in 1640. Of Parkinson there is a somewhat full account in Pulteney,²⁸ to which a few points are added in the *Flora of Middlesex* (p. 372) and by the late Mr. G. W. Johnson in the *Journal of Horticulture* for 1875.²⁹ He was born apparently in Nottinghamshire, in 1567, and practised as an apothecary in London, having a garden in Long Acre at least as early as 1616 and becoming apothecary to James I. Not till he was past sixty-two did he publish his first work with its curious punning title *Paradisi in Sole Paradisus Terrestris*, Folio, pp. 612, dedicated to Queen Henrietta Maria, with an engraved portrait of himself by Switzer. This book, the title of which is, "being interpreted," "Parkinson's Earthly Paradise," deals with garden plants, describing nearly a thousand and figuring 780 on 109 plates specially engraved in England. Its quaint phraseology attracted the late Mrs. Ewing, whose charming story, *Mary's Meadow*, has perhaps increased the modern vogue for the book among collectors which it shares with all old herbals. The reference on p. 359 to *Convolvulus purpurens spicafolius* at Dunmow, already quoted, is the only Essex reference that I have found in this work. In 1640 Parkinson published his *Theatrum Botanicum*, London, folio, pp. 1746. This work, originally intended to be merely a supplement to the *Paradisus* dealing with "A physical Garden of Simples," grew into a most comprehensive herbal, describing nearly 3,800 species, as against Johnson's 2,850, with newly cut figures of over 2,500, very full details as to medicinal uses, and a synonymy which, while incorporating nearly the whole of Bauhin's *Pinax*, shows also independent reference to the original authors. Though published seven years after Johnson's edition of Gerard, its preparation dated from an earlier time, whilst it is in many respects more original than either Johnson or Gerard. At the time of its publication Parkinson obtained the title of King's Herbarist or Botanicus Regius Primarius. He died in London

²⁸ *Sketches of the Progress of Botany*, 1790, vol. i., pp. 138-152.

²⁹ See Britten and Boulger, *Biographical Index of British and Irish Botanists*, p. 131, and notice, by the present writer, *Dictionary of National Biography*, vol. xliii.

in August, 1650, and was buried in St. Martin's-in-the-Fields. His additions to the Essex list are the following :—

- Mentha pulegium* L. (*Theatrum*, p. 29).
Verbascum nigrum L. (p. 61).
Atropa belladonna L. (p. 348).
Chrysosplenium oppositifolium L. (p. 425.)
Stachys palustris L.
Silene anglica L.
Angelica sylvestris L.
Lathyrus sylvestris L. ?
Lomaria spicant Desv.
Salix helix L.

Of these records two, viz., *Chrysosplenium oppositifolium* and *Lathyrus sylvestris*, are not referred to by Gibson; but, in his table of earliest and latest notices (*Flora of Essex*, p. 412), he, by a natural misunderstanding, makes Parkinson record *Vinca minor*, whilst the passage (*Theatrum*, p. 383) undoubtedly refers to *Clematis vitalba*. Some special interest attaches to the following records :—

pp. 83-4. "*Matricaria bullatis floribus aureis*. Naked Featherfew. This kinde differeth not from the former, but that it hath his flowers, without any of the pale or border of white leaves about it, and therefore being naked, and without those leaves I have named it naked Featherfew . . . grew in Essex, and was there found by a gentleman called Master *William Coys*."

This is some abnormally rayless chamomile, perhaps *Chrysanthemum parthenium* Pers.

p. 425. "*Saxifraga aurea*. Golden Saxitrage . . . at *Chepstow* in *Essex*."

The figure represents *Chrysosplenium oppositifolium*; but whether "*Chepstow*" or "*Essex*" be a slip it is difficult to say.

p. 588. "*Sideritis Anglica strumosa radice*. Clownes Woundwort . . . in Essex by the ditch sides, and on the ditches sides on the left hand of the high way beyond *Stratford Bow*."

This plant, *Stachys palustris*, named Clown's Woundwort by Gerard, is one of those species delightfully idealised by Mr. Walter Crane in his *Floral Fantasy*.

pp. 638-640. "*Lychnis arvensis minor Anglica*. The small white field Campion . . . groweth in divers grounds by Colchester in Essex, and in a field called the Millfield, behind the house of Sr. *Thomas Lucees* neare *Colchester*."

Silene anglica is still mainly confined to the north-east of the county.

p. 720. "*Melilotus vulgaris*. Common Melilot . . . in Essex in divers places . . . in some places of Essex they call it Hartwort, because they thinke the seede thereof happening into their bread caused paines in the stomacke and chest, which they usually call the Heart burne." [*Melilotus officinalis* Lam.]

pp. 1059-1060. *Pisum sylvestre alterum*. The other wilde Pease . . . Of this kinde there is another found to grow somewhat larger . . . on the chalkie hills at *Kings Hay* in *Kent*, not farre from the *Thames*, and the larger sort hereof in some barren fields in *Essex*."

From the habitat I take this to be *Lathyrus sylvestris* L. previously recorded by Gerard from the Chalk at Swanscombe Wood, Kent.

pp. 1043-4. "*Lonchitis asperia minor*. The smaller rough Splenewort . . . There is another of this sort lesser than this, found about Colchester in Essex." [*Lomaria spicant* Desv.]

p. 1064. "*Lathyrus annuus*. Yearely or Annuall Cichelings . . . All these [eight] sorts except the sixt (which I found in clensing of Anneseede to use) grow in *Spain*, and from thence were brought with a number of other rare seedes besides by *Guillaume Bœl* and imparted to Mr. *Coys* of *Stubbers* in *Essex* in love, as a lover of rare plants, but to me of debt, for going into *Spain* almost wholly on my charge hee brought mee little else for my mony, but while I beate the bush another catcheth and eateth the bird: so while I with care and cost sowed them yearely hoping first to publish them, another that never saw them unlesse in my Garden, nor knew of them but by a collaterall friend, prevents me whom they knew had their descriptions ready for the Presse."

It would not be easy now to identify these exotic species first grown in an Essex garden. The querulous allusion would seem to be to Johnson, whose "agility" and "younger yeares" are slightly referred to in Parkinson's address 'To the Reader,' since these plants grown from seeds given to him by Coys in 1620 and 1621 are described in the Appendix to his edition of Gerard (pp. 1626—1629). It is only fair to add that Johnson (p. 1628) acknowledges having gathered some of these seeds "in the garden of my good friend Mr. *Joh. Parkinson* an Apothecary of London, *Anno 1616*."

The Rose Willow, figured on p. 1430, and stated on the next page to occur "in sundry places of Essex" is an aggregation of leaves terminating a shoot of *Salix alba* L., *S. fragilis* L., *S. caprea* L., or other species, whether pollarded or not, and replacing the scales of a catkin or the foliage-leaves of an ordinary bud. "The gall" for gall it is, "consists of an imbricate mass of shortened, sessile, and crowded leaves: in the centre is a small, hard, inner gall, which contains one or more larvæ of the gall-gnat . . . *Cecidomyia rosaria* H. Loew."³⁹

³⁹ E. A. Fitch, "The Galls of Essex." *Trans. Essex Field Club*, vol. ii., p. 148; M. T. Masters, *Vegetable Feratology* (1809), p. 105.

With reference to subsequent accusations it is necessary to mention that Parkinson says, on the title-page of the *Theatrum*, that "the chiefe notes of Dr. Lobel, Dr. Bonham, and others" are "inserted therein"; and, on p. 1060 of the same work, that certain matter "he prevented by death failing to perform it, I have by purchasing his Workes with my money here supplied." As we know Lobel to have visited Coys and have little clue to Parkinson's being in the county, it is possible that all these Essex records may belong to Lobel, as do others not published until 1655 when Dr. How, whose *Phytologia* had appeared five years previously, issued the fragment known as Lobel's *Illustrationes*.

Though chronologically Lobel should have been mentioned earlier, we may insert a short account of him here. Born at Lille, in Flanders, in 1538, the son of Jean de Lobel, a lawyer, and early acquiring a taste for botany, he matriculated in the faculty of medicine at Montpellier 22 May, 1565, choosing Rondelet, Regius Professor of Medicine "pro parente." Here he made the acquaintance of Pierre Pena, a Provençal who had matriculated in the same faculty a few weeks before, but was probably Lobel's senior. Rondelet dying the following year bequeathed his botanical manuscripts to Lobel and the two fellow-students came to England. Here in 1571 they published *Stirpium Adversaria . . . authoribus Petro Pena et Mathia de Lobel Medicis*,³¹ a work of great importance, containing, says Pulteney,³² "the first sketch, rude as it is, of a natural method of arrangement."

Pena seems soon afterwards to have abandoned botany, becoming Secret Physician to Henri III., and dying worth more than 600,000 livres! In 1576 Lobel published, through Plantin, the great Antwerp printer, *Observationes*, with 1486 illustrations, Plantin buying 800 copies of the *Adversaria* from the London printer Thomas Purfoot for 1200 florins and binding them at the end of the *Observationes* with the new joint title *Plantarum seu Stirpium Historia Matthia de Lobel Insulani* and a new title-page. For this work Philip II. in 1577 decreed to Lobel a recompense of 50 livres and in 1581 the whole was published in Dutch, with

³¹ In his *Guide to the Literature of Botany* (1881), p. xxvi., Mr. B. D. Jackson wrote of Pena as Lobel's "shadowy colleague." Since then M. Ludovic Legré, in his *Pierre Pena et Mathias de Lobel* (Marseilles, 1899), has thrown a flood of light upon this "shadowy" personality, showing that most of the continental travel previous to 1565 alluded to in their joint work was Pena's and that his name, though subsequently dropped by Lobel, probably came first on the title-page as that of the senior and chief author. The dedication is dated Christmas Eve, 1570; the colophon January 1st, 1571.

³² *Historical . . . Sketches*, i., p. 101.

a total of 2116 figures, under the name *Kruidtboeck*. A copy of this edition with the figures coloured is now in the Musée Plantin-Moretus at Antwerp. At the same time an impression of the *icons*, with 75 additional ones, was printed in an oblong quarto, and in 1591 this was reprinted with "an index, in seven languages, which rendered it a very popular book for many years."³³ In 1592 Lobel went to Denmark in the train of Queen Elizabeth's ambassador, Lord Edward Zouch, and, apparently after this, he had the charge of a physic garden at Hackney, of which Lord Edward paid the expenses. He obtained the title of Botanographer to King James I, published a second edition of the *Adversaria* in 1605, and died at Highgate, 3rd March, 1616. He had a daughter married to Mr. James Cole or Coel, "a merchant of London, a lover of plants, and very skilful in the knowledge of them," to whom we owe the introduction of the cherry-laurel (*Cerasus lauro-cerasus*). As Cole lived at Highgate, Lobel may have spent his last years in his daughter's house. It is also nearly certain that Paul de Lobell, the apothecary of Lyme Street who married the sister of Dr. (afterwards Sir Theodore) Mayerne, physician to James I., and who was employed to give the poison to Sir Thomas Overbury in 1615, was a son of the botanist. "Lobel had meditated a very large work, which was to have borne the title of *Illustrationes Plantarum*; but he lived not to finish it. Some of his papers fell into the hands of Parkinson, and were incorporated into his *Theatrum*. A fragment of the above-mentioned work was published by Dr. How, in 1655; which contains the descriptions of many grasses, and other plants newly discovered, or lately introduced. Of the grasses, many here recorded were first discovered by Lobel. The preface contains some severe censures on Gerard, and reflexions on the treatment Lobel had received from booksellers; all written in a style very reprehensible in a man of letters."³⁴ Even a somewhat partial biographer, M. Edouard Morren, is compelled to admit that "Son caractère personnel, entaché de jactance et d'orgueil, perce trop souvent dans ses écrits."³⁵ Lobel's undoubted additions to our Essex list are mainly in this fragment of the *Illustrationes*, though there is one other on which I must give a few details. In Parkinson's *Theatrum*, pp. 1234 and 1236, appears the following record:—

33 Pulteney, *op. cit.* p. 105.

34 Pulteney *loc. cit.*

35 *Matthias de l'Obel, sa vie et ses œuvres.*

"2. *Limonium medium Anglicum*. The Colchester Marsh Buglosse. This other sort is like unto the former, but lesser in leaves, and lower in stalks, being little more than a foote high, the flowers are of the same colour with it, and almost as great, but the roote being reddish is much lesse . . . The second is of our owne Land found out by Doctor Lobel, in the fieldes neere the Sea by Colchester."

The "former" is undoubtedly *Statice limonium* L. When Gibson writes "Gerard's figure seems quite as like *S. bahusiensis* : but he does not distinguish the plants" (*Flora* p. 252), he, presumably from his reference, refers to Johnson's figure (*Ger. em.* p. 411) and not to Gerard's (*Herbal*, p. 332), though neither, to my mind, much resemble the species we now know as *S. variflora* Drej. On this smaller form Ray writes (*Synopsis methodica Stirpium Britannicarum*, ed. i., 1690, p. 61).

"Aliam speciem Limonii à Lobelio inventam in agris Colcestrensibus propè mare memorat Parkinsonus : Gerardus quoque Limonium minus a se observatum scribit in clivis maritimis insulæ Thanet prope Margate. Nos unicam duntaxat speciem in Anglia spontaneam observavimus, quæ tamen magnitudine insigniter variat ratione loci in quo oritur ; major scilicet quæ in palustribus salsis, minor quæ in clivis & rupium fissuris."

In the Appendix furnished by Petiver to the second edition of the *Synopsis* (1696), p. 342, however, appears the following addition :—

"Limonium minus a D. Dre. Plukenet in Anglia repertum & collectum hoc anno florens a me inspectum in Horto Regio S. Jacobi, a vulgari majore manifeste distinctum esse agnovi, non solum quod minus sit, sed quod folia alis continentur usque ad radicem, adeo ut folia pediculis carere dici possint ; Doody."

In the third or Dillenian edition of the *Synopsis* (1724), p. 202, whilst Ray's original statement of his belief that there is but one British species stands unmodified, this note of Doody's follows it, with the addition.

"Dood. Syn. II. 342. Prope Harwich. Limonium minus maritimum nostras Pluk. Alm. 220. Limonium parvum Ger. 332. Em. 411. At Ramsgate in Kent. Mr. Dale."

This Ramsgate specimen is in the British Museum Herbarium and is *S. occidentalis* Lloyd. The Dillenian *Synopsis* then adds this third species :—

*3. *Limonium Anglicum minus*, caulibus ramosioribus, floribus in spicis rarius sitis *R. Hist.* III. 247. I found this on the Sea-banks, by the Tide-mill at Walton in Essex, and the same (only larger) on the Sea-banks of the Marsh on the left hand of the Road from Heybridge to Maldon in the same County ; Mr. Dale. Found also by Mr. Sherard and Mr. Raul, at the Mouth of the River that runs from Chichester. Folia longiora sunt & magis acuminata, serius etiam floret Cæteris speciebus flores magis umbellatim dispositi sunt & densius stipati ; D. Doody.

Dale's specimen, labelled as in this extract, is in the British Museum Herbarium and is *Statice rariflora* Drej. He first recognised it in 1700 and in Ray's *Historia Plantarum*, vol. iii. (1704), p. 247, it is recorded, for the first time, in the words, "Waltonæ vico in Essexia non procul ab Harvico portu prope Molendinum copiosum invenit D. Dale nobisque communicavit." Thus, though the discrimination of *S. occidentalis* would seem to have been the work of Doody,³⁶ that of *S. rariflora* is clearly that of his friend and correspondent Dale.

We have, or have had, four forms of *Statice* in the county, *S. limonium* L., or, as perhaps for clearness we ought to term it *S. bechen* Drej.³⁷; its variety *pyramidalis* Syme, formerly known as *S. serotina* Syme; *S. rariflora* Drej.; and *S. auriculifolia* Vahl., var. *occidentalis* (Lloyd). These are represented by ten specimens in the British Museum Herbarium: *S. limonium* by five, viz. (1) Dale's, labelled "About Maldon. An *Limonium* medium Anglicum Lob. Illustr. 90. Park. 1234. *Limonium maritimum majus alterum serotinum Narbonense* Hort. Reg. Par. Schol. Bot. 6"; (2) Sir John Hill's, from "salt-marshes near South Bamfleet"; and three of Edward Forster's, from "near Maldon," "St. Osith," and "Purfleet"; var. *pyramidalis* Syme, by specimens of Edward Forster's from Maldon and "the field near the Hotel at Purfleet"; *S. rariflora* by Dale's Walton specimen and one of Forster's from Maldon; and *S. auriculifolia*, var. *occidentalis* by one of Sir John Hill's from "Candy [sic] Island in Essex on the farther side of the Island near the Ale-house." As Gibson appends to Ray's Harwich record of this last-mentioned form the note "Probably now lost" and does not mention Canvey Island, this latter locality must be researched. It is also by no means improbable that *S. reticulata* L., not yet recorded for the county, may occur.

In the *Illustrationes* there are eight or nine Essex records, five of which had been anticipated in Parkinson's *Theatrum*, whilst one cannot readily be identified. They are, I believe

- Agrostis pumila* L.
- Brassica oleracea* L.
- Statice limonium* L.
- Silene anglica* L.
- Mentha pulegium* L.
- Lomaria spicant* Desv.
- and *Lathyrus sylvestris* L.

³⁶ Samuel Doody (1656-1706), keeper of Chelsea Garden, 1692-1706. See Britten and Boulger, *Biographical Index of British and Irish Botanists*.

³⁷ See A. Bennett, *Journ. Bot.* 1894, pp. 365-8.

As they are few and the book is rare I will give them at length, as they occur.

p. 20. "*Gramen minimum Anglo-Britanicum*. Arenoso solo versus Oceanum aliquot miliaribus à Lio, prope Thamesis ostia oritur, folia admodum exilia, plura simul congesta, unciam & sesquiunciam longa: cauliculi ipsi foliolis paulo longiores, in quibus arctiores eminentia, raras spicas parvulas referentes."

This is identified by Sir J. E. Smith (*English Flora* (1824), vol. i., p. 85) with his *Knappia agrostidea* i.e. *Mibora verna* Beauv.; but Gibson remarks on this identification "neither old herbaria, nor diligent search in the locality confirm this. As *Agrostis pumila* Light. is abundant there, it may have been the plant originally intended." To *Agrostis pumila* L., classed in the London Catalogue (9th edition) as a variety of *A. vulgaris* With., Nyman³⁵ adds the comment, "status morbosus, spiculis uredine corruptis." "Lio," it may be explained, stands for Leigh.

p. 21. "*Gramen exile vicinorum maris aggerum, numerosa gracillimorum latiusculorum uncialium foliorum sobole*. Sex miliaribus Anglo-Britannicis à Lio, non procul ab ædibus D. Wedston oritur, digitales, unciales & sesquiunciales emittens cauliculos, congestis Salicis maritimæ minoris catulis confertos, coryllis stipatim inter numerosa folia præditos. Radix exiua capillaris. Hæc supradicta exigua & tenuia maritima gramina oviaria depascitur." In the margin How adds "*Gr. exile vicinorum maris aggerum Park. pag. 1278. sine Ic. Th. Bot. & Lob. M.S.* Among his names he glories that it hath not been remembered by any Author before."

Parkinson's description of this grass in the *Theatrum*, where he gives no figure, is as follows:—

"6. *Gramen exile vicinorum maris aggerum*. A small grasse of the Sea downes. The small Sea grasse shooteth forth divers short stalkes of two inches long, full of small long leaves like haire, set close together, and among them at the toppes small heads, like the catkins of the dwarfe Willow, the root is small and threddy."

These descriptions do not enable us to identify the plant. It might be *Festuca ovina* L., the *Gramen capillaceum locustelis pinnatis non aristatis* of Ray's *Historia Plantarum*, vol. ii., p. 1288. (1688); but this is merely a conjecture.

pp. 82-3 *Brassica vulgaris arborescens Flandrica* Maris incolæ Essexiæ ea vescuntur ad lubricand: alvum ex jusculo pingui, Provenit etiam toto illo tractu littoreo à Dovero, Ryam, & inde ad Vectem insulam." [*Brassica oleracea* L.]

p. 90. "*Limonium medium Anglicum* Herbidæ Colchestrænsis amnis crepidines, pelagi æstu quandoque inundari solitæ, hoc Limonio uberi preventu gliscunt." [*Statice limonium* L. ? Vide supra, p. 181].

p. 96. "*Campanula cœrulea supina*. Ex insula (Isle of Fowle) Anglo-Britan. vernaculo, id est, Avium, vocat: Lincoln: præfecturæ."

³⁵ *Conspectus Floræ Europææ* p. 801.

The description of this plant seems to apply to *Pneumaria maritima* Hill; but this is not a likely plant for Lincolnshire or Essex. Is the "Isle of Fowle" Fowlness, or is it Foulney, off the coast of Lancashire? *Pneumaria* is recorded for "one of the Isles about Lancashire" in Parkinson's *Theatrum* p. 767, on the authority of Mr. Thomas Hesketh, under the name of Lancashire Buglosse.

p. 97. "*Lychnis arvensis Anglica* . . . agro proximo retro ædes C. D. Thomæ Lucas equitis Colchesteriensis agri." [*Silene anglica* L., as in the *Theatrum*, p. 638].

p. 105. "*Pulegium regium vulgare majus* . . . media via regia qua itur Londino Colchestriam." [*Mentha pulegium* L., as in the *Theatrum*, p. 29].

p. 149. *Lonchitis altera minor*. Hujus species tota minor reperitur prope Colchestriam . . . quam primus mihi ostendit Thom. Boxton, Pharmacopæus ibidem doctissimus." [A small form of *Lomaria spicant* Desv., as on p. 1043 of the *Theatrum*.]

p. 164. "*Pusillum Pisum aliud sylvestre, spontaneum* . . . In Essexiæ autem comitatu" and also at King's-Ley, Kent. [Probably *Lathyrus sylvestris* L., as on pp. 1059-60 of the *Theatrum*.]

(To be continued.)

THE BLACK-HEADED GULLS IN ESSEX (1899).

By PERCY CLARK, B.A.

With Plate V.

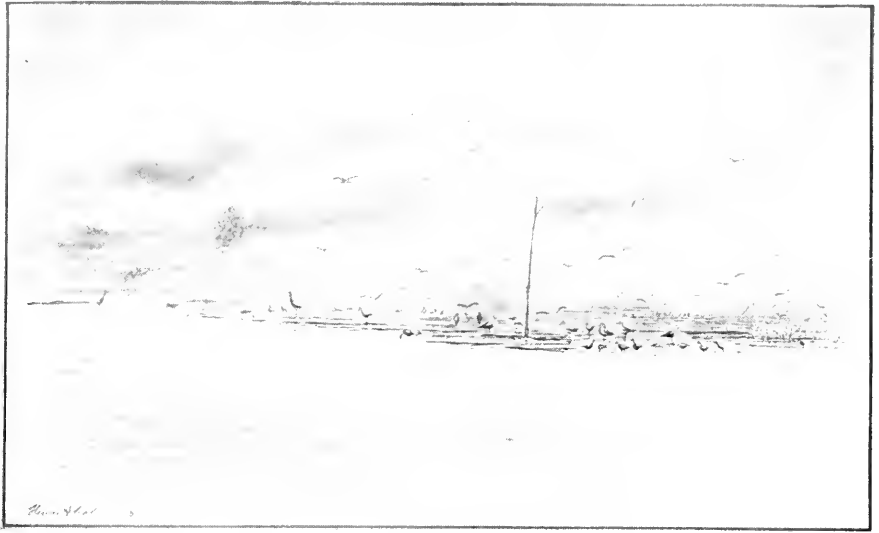
THE following notes of my second annual visit paid last summer (1899) to the Essex Gulleries, are culled from the log of a small yacht, on board of which I was living at the time in question. This must be my excuse for a somewhat rough and disjointed accounts; till it may be of interest to those Essex naturalists who are concerning themselves in the preservation of our seashore birds.

The report below is a most encouraging one, and in marked contrast to the somewhat despondent tone which was forced upon me by the depressing state of affairs when I wrote in 1898 (see ESSEX NATURALIST, x., p. 389).

GULLERY NO. 1.

"June 26, 1899, Brightlingsea.

"After anchoring the yacht at high water in Beach Hole Creek, I took the dinghy and rowed up the inlet another mile, and very soon found the spot where the Black-headed Gulls were breeding on the wide waste of saltings, by their sudden rise on the wings and loud outcries as I approached.



AT THE EBBING TIDE, EAST MERSEA FLATS. *Christmas 1898.*



LEE WICK, FROM SANDY POINT, BRIGHTLINGSEA.
From sketches by H. A. Cole.

“On landing I discovered that the colony lay on the top of the saltings, by some shallow pools of brackish water, left by a very high tide, and there on the edges I found the nests. These were slight, loose structures composed of dead reed stalks and dried *Zostera marina*, barely raised above the level of the saltings. A few nests were somewhat more substantially built and hence more elevated, but none rose to any considerable height, and I saw one or two eggs in mere depressions of the ground, with no nest at all.

“There were certainly over 100 birds wheeling overhead, and I found without any trouble about 40 nests; I daresay there may have been 60. Some were empty, some had one egg, the majority held two eggs and one nest held three. I found two fine young birds, one in the shallow pools mentioned above, and another in a deep cut left dry by the receding tide. I discovered two others drowned in the pools, a calamity for which I cannot account.

“Neither of the young ones I found were fully fledged, and they lay perfectly still until I touched them, but upon my doing so one of them vigorously attacked my fingers with his soft baby beak.

“Being well satisfied with the state of affairs I did not linger long, and the piteous cries of the parents overhead was a further inducement to be gone.

“This is apparently only the second year in which the gulls have here bred on the saltings. Formerly they built a mile further inland among the reeds and rushes of the freshwater fleets and ditches, where they erect very large and lofty nests, and about fifty birds are breeding there this summer. Mr. Cross, the tenant farmer, who owns the marshes, takes a great interest in the gulls and looks well after their protection, for which all Essex naturalists owe him a debt of gratitude; besides which he is a keen sportsman and naturalist, and has many rare birds stuffed in his charming farm at Lee Wick, such as Brent Geese, a white Reed Bunting, and a Dusky Tern.”

I paid a second visit to this gullery on *July 7th, 1899*, eleven days later, and I have recorded in my log that there were only two nests left with eggs in them. I found two more fine young birds nearly fledged, but no others. The number of gulls seemed to have increased, as I computed this time that there were nearly 200 to be seen.

From a distance I saw several Herons pursued by the parent Gulls and an amusing sight it was to watch the manner in which they were harried by the smaller birds and eventually forced to beat a reluctant retreat from the sacred nurseries.

Hard by on the sea-beach I observed two fine Oyster-catchers, who hovered over and around me uttering their long drawn whistles, and it is very probable that they had some eggs on the rough shingles which line the shore on the seaside.

GULLERY NO. 2.

“On *June 28th, 1899*, I visited the Gullery on the Tollesbury flats, an account of which I wrote for the *ESSEX NATURALIST* last year (Vol. x., pp. 388-393). Again this year my first impressions were those of disappointment, for on reaching the little pond I then described, where in 1898 a small gullery existed, I saw barely any gulls at all.

“The same enormous flock of Herring and Black-backed Gulls were reposing on the sandy banks of the fleet close by and there were numerous Ducks, Coots, Moorhens, and a few Shelducks.

“There were only about eight Black-headed Gulls flying overhead, but on reaching the shallow pond and ditches above which they hung screaming, I discovered, to my surprise, a great number of nests among the rushes. I waded into the shallow water, by means of sea-boots, but found only one nest containing three eggs. There were several neat little Moorhens' nests with their usual large consignment.

“One or two of the gulls' nests seemed to be just building, as the flags of which they were composed were quite green and fresh, and they were all large structures raised above the level of the water among the stunted reeds. I should have mistaken them for Coots' nests, had I not been aware that the latter birds scoop out a considerable hollow for the eggs, while the nests of the gulls are almost flat on the top, a consequence of which is that the eggs sometimes roll off into the water, as I have found before now.

“The question whether the gulls do not make use of the coots' nests, who hatch out earlier in the year, is one which I have not the means so far to determine.

“A sad sight here met my eyes and made me pause. Lying close by a large well-formed nest, I discovered a beautiful Black-headed Gull quite dead, with a gaping wound in its back, and on

the nest the decaying remains of her young one, and an empty egg shell. This meant a terrible bird tragedy, some evil disposed crow, or could it be a Black-backed Gull, had evidently killed the mother after a gallant struggle, and devoured portions of the young one, and probably sucked the egg.

“With chastened feelings I walked on to the Decoy startling the ducks and coots and moorhens from among the thick clumps of tall rushes, and then sweeping the marsh with a pair of Zeiss glasses discovered by their help far away to the westward more Black-headed Gulls hovering low over some rushes, which I knew denoted more nests.

“On arriving at my destination I found a large sheet of fresh water, and was rejoiced to find another strong colony. In all I calculated about seventy birds, and though the water was deep and wide, I managed to wade right out into the middle among the rushes and was well rewarded.

“Here the nests were completely hidden by the tall thick reeds. I found over twelve nests many with eggs and one with four, some young ones just hatched, and four young birds sitting floating on the water hard by who never moved an inch though I nearly stepped on them. The nests were large substantial structures of considerable height, but clumsily made and almost conical on the top. I found one egg floating in the water.

“I did not stop long to hunt for more, being very well satisfied, besides the muddy water stunk in a horrible manner and my boots began to let the water in, causing me considerable discomfort, and all the while the parent birds were in the utmost consternation and very nearly knocked off my cap several times in their endeavour to frustrate my search.

“On my way back I came across another diminutive colony of six or eight birds in a distant ditch, where I found a nest in course of construction, so that probably detached or smaller colonies breed all over these vast flat marshes.

“In all there may have been nearly one hundred birds breeding in this neighbourhood this year; a strong contrast to the meagre twenty I found last summer. I am inclined also to believe that the gulls, who are very capricious creatures, first began to build their nests around the small pond mentioned above and then deserted them for some unknown reason for the larger fleet I had just visited.

“The Black-headed Gulls have several distinct cries. One

a sort of broken caw, another a long drawn or screaming caw, and sometimes when they swooped down at me, a note like a small dog's bow, wow, wow."

GULLERY NO. 3.

The next Gullery, No. 3, in Hamford Waters, was I consider a decided find, as it is I believe an entirely fresh one, and promises to be the most vigorous of the three.

Hamford Waters with its islands, weird stretches of mud covered with sea aster, its decaying remnants of old sea walls, its lagoon like waters and intricate channels, must always have a great fascination for the naturalist, and thither I next set sail.

"On *July 12th, 1899*, having navigated the somewhat narrow entrance to the Waters, I anchored off Pewit Island and landed in the dinghy to inspect. It was high water, and I found the island inside the destroyed sea walls, a vast sheet of water, the sea pouring over the walls in a great cataract, and the lone farmhouse rising bare and deserted in the midst of the tidal waste.

"Only some posts and a knoll or two rose above the surface of the lagoon, so that my hopes that the island would become a bird nursery must now be entirely abandoned. There were immense flocks of gulls and sea fowl of all sorts and kinds in sight, but they were there to feed and not to breed.

"Not far away, however, on another island or insulated salting by the help of my glasses I discovered some more of my friends, and rowing up in the dinghy, a great flock of Black-headed Gulls immediately rose in a cloud, making a great noise. In all I should put them down roughly to a little under a hundred birds.

"Quickly having landed (as the tide was falling) I found myself on a large salting, on the highest points of which and just above high water mark, spring tides, I soon discovered over twenty nests. They were very untidy loose constructions like those on the saltings by Brightlingsea, a few dead reed stalks and old straws laid on the thick matted grasses and sea-sedge, some with only a few fragments and others somewhat larger.

"All the eggs were evidently hatched, as I only found one nest with two eggs; indeed one could see the young birds in the distance fully fledged and swimming about in the water, jealously watched by their respective parents, who were apparently tempting them to fly or teaching them where to look for food. One

or two not yet able to use their wings, I noticed scurrying away among the muddy little islands, and quickly hiding themselves in the thick sedge or grass with which all the saltings are covered.

“The spot is peculiarly favourable for a gulls’ colony, being out of the beaten track, well surrounded by extremely deep tidal channels, and not far from a Coastguard Station whose officers I have no doubt would be quite willing, if requested, to look after the interests of the birds and see they are unmolested.”

This concludes my notes this year, 1899, about the gulls in Essex. There may be other Gulleries among the islands of the Essex Archipelago at the mouth of the Crouch, but so far I have not heard of or come across them, though every year I confidently expect they will increase in number.

These sagacious birds appear to be the first to have discovered that the Essex shores are a protected area, and having now realised the fact (sic.) we may expect them to utilise our coasts more and more.

Every winter the gulls come up the London river in larger numbers and naturally they will be all the more likely to form breeding grounds in suitable localities, close to their favourite winter quarters. Moreover they appear to be reverting to their old time-honoured custom of nesting on the saltings and islands round the Essex coast, which a century ago they did in such numbers. It was probably only the spoliation and destruction which they began to suffer later, that forced them to find shelter among the reedy beds of more secluded fleets inland, and that also entailed their constructing larger and more elaborate nests to raise their eggs above the uncertain level of those freshwater localities.

Before long we may expect to find our low coast and marshes fringed with myriads of these beautiful and harmless creatures, lighting up the muddy stretches of foreshore with their snowy plumage and lending a beauty and gaiety to scenes which without them are often dull and even depressing.

In conclusion I may say I know of two small colonies of Lesser Tern in different parts of the Essex coast, but they are so precious and still so small, I dare not mention the exact positions even in the pages of the *ESSEX NATURALIST*.

The Ringed Dotterel or Plover also abound and seem to be increasing, but I don’t think any Common Tern breed with us.

The action of the Essex County Council in enforcing the Bird Preservation Act and protecting the area of the coast¹ has done and is doing a great work for which all lovers of nature and wild life must feel grateful, but constant vigilance is still needed, and rigorous prosecution of offenders should be strictly enforced.

December 6th, 1899.

¹ The County Council of Essex took action in this matter at the suggestions of the Essex Field Club set out in a petition to the Council presented in the spring of 1895 (see text of Petition with explanatory details, in *ESSEX NATURALIST*, vol. ix., pp. 42-47). After considerable delay, the order protecting the Shore-birds was issued by the Home Secretary on February 6th, 1896, as mentioned in Mr. Champion B. Russell's article, *E.N.*, vol. ix., pp. 218-222. The beneficent effects of this Order is shown in the reports on the "Protection of Wild Birds in Essex" in subsequent parts of our Journal.—ED.

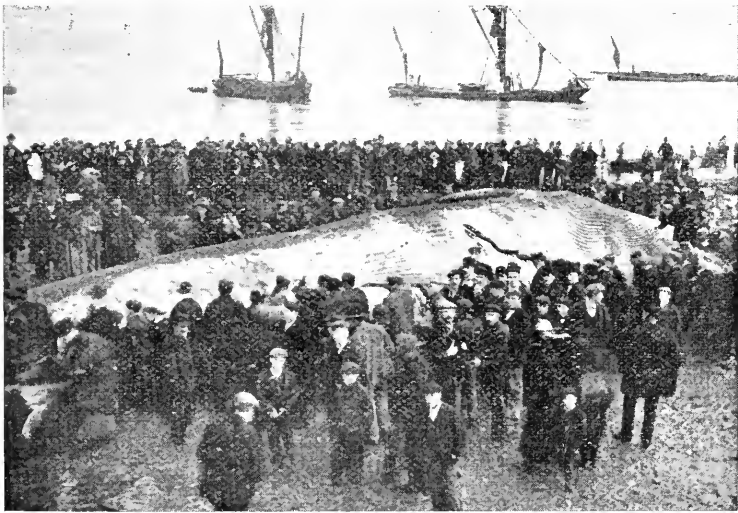
STRANDING OF A COMMON RORQUAL WHALE IN THE THAMES AT NORTH WOOLWICH, ESSEX.

ABOUT nine o'clock on the morning of Monday, the 27th November last (1899), a great Whale appeared in the Thames in the stretch of the river called Gallions Reach, which runs from the Albert Docks to Barking Creek. Several tugs went out to capture the animal. It is stated by the reporters that for four hours the tugs chased the visitor from Trip Cock Point to Silvertown Petroleum Works, and "the whale responded by whisking her tail vigorously and drenching the hunters with dirty Thames water." At last it was run ashore near the ferry opposite the Pavilion Hotel, North Woolwich, and there done to death, but not without a tremendous struggle. One newspaper stated that the whale "gave a magnificent spouting exhibition just before the end. Onlookers estimated the spout of water at 40 or 50 feet high" (!)² The whale was a female, measuring 66 feet 7 inches long, with a girth of 33 feet, and was estimated to weigh about 30 tons. On the Wednesday, the mammal, which had been rapidly decomposing, burst, and disclosed two calves. Some men slit the body open and delivered the young ones, one living about 20 minutes and the other only a very short time. During the night one was stolen, but one remained on exhibition with its mother. It measured 17ft. 9in. with a girth of 7 feet.

The animal was announced in the papers as a "Bottle-nosed Whale" but this was clearly an error, and in a letter Mr. R. Lydekker, F.R.S., has kindly given us the correct name of the species. Mr. Lydekker writes, "I myself went down to look at

² As most of our readers know, this spout of "water" is in reality a column of air from the lungs highly charged with vapour and possibly carrying up with it some of the water surrounding the "blow-hole" of the whale should it spout from below the surface.

the Woolwich whale. I only saw one of the young ones, which was a *Balænoptera*. From the description given me of the size of the old one, I judged the species to be *B. musculus*." In a communication to *Nature* Mr. Lydekker states that the young one differed from the adult in that the under surface of the body was flesh-coloured instead of white. This whale, the Rorqual or "Finner Whale" has been several times stranded in the estuaries of the Thames, and two instances of its appearance in the Crouch River are recorded in the *ESSEX NATURALIST* (vol. v. pp. 124 and 134). The first specimen was very carefully described and well figured by Mr. W. Crouch in our journal, and the drawing is repeated in Dr. Laver's *Mammals, &c., of Essex*.



WHALE STRANDED AT NORTH WOOLWICH, November 27th, 1899.

We are indebted to the kindness of Mr. W. Harris, Contractor, of North Woolwich, for two photographs, one of which is here reproduced. It unfortunately does not show the poor Cetacean very clearly, but will serve to give a vivid idea of the size of an animal which is probably the largest living creature. We have not heard what has become of the Woolwich calf, but the mother was towed out to sea by the sanitary authorities. It will be remembered that there is a life size half-model of *Balænoptera musculus* in the Whale-room at the British Museum of Natural History, together with a like representation of the Tilbury specimen of the allied species, Rudolphi's Rorqual, *B. borealis* (see *E.N.*, vol. ii., pp. 41-46).

THE ESSEX FIELD CLUB.

EXCURSION TO CHARLTON, KENT.

SATURDAY, JUNE 24TH, 1899.

On this afternoon, at the invitation of the Croydon Natural History Society, Geological Section (of which our former member, Mr. N. F. Robarts, is *Hon. Secretary*), a joint meeting of the two societies was held at Charlton, near Woolwich, and was well attended by members of both Clubs. Dr. H. Franklin Parsons, F.G.S., and Mr. Robarts were the Conductors, while Mr. W. H. Dalton, F.G.S., Mr. T. V. Holmes, F.G.S., and Mr. W. Whitaker, F.R.S., also aided in giving short "demonstrations in the field." We are indebted to the courtesy of Dr. Parsons for the following excellent account of the geological observations made:—

The chief interest of the excursion was geological, its objective being a large sandpit about about half a mile east of the station, permission to visit this pit having been kindly given by the proprietor, Mr. Gilbert. This pit is at the N.W. corner of a grassy hill commanding a fine view of the Thames. On the flat summit of this hill are the remains of an ancient (? Roman) Camp, but the entrenchments have been much encroached on and destroyed by the excavations which have been subsequently made on the sides of the hill. This is especially the case on the east side, where the wall of the camp has been entirely destroyed by a very large excavation, now disused and converted into a recreation ground for Woolwich. The numerous large excavations, now mostly disused, which exist along the ridge of hill overlooking the Thames, were made in former times, chiefly for the purpose of digging sand and gravel as ballast for ships returning to the Tyne and other northern ports after having brought cargoes of coal to London. The digging of sand and gravel for this purpose has now been superseded by the use of water ballast. Mr. Gilbert's pit is worked chiefly for the purpose of obtaining moulding sand for foundry use. It exhibits a fine Oldhaven section of the strata from the Oldhaven Pebble bed to the Upper Chalk inclusive. The Upper Chalk is seen in the bottom of the pit, and a few specimens of *Inoceramus* and the commoner Sea-urchins were obtained from it. At the junction of the Chalk with the superjacent Thanet Sand is a bed of green-coated unworn flints. This bed ranges in thickness from 6 to 18 inches or more, being thicker where it fills up hollows in the surface of the chalk beneath. Above this is the Thanet Sand, for which the pit is worked. This bed is some 30 to 40 feet thick. The lowermost portion, 7 feet thick, and locally called "blackfoot," is of a somewhat loamy nature, and is valuable for moulds for brass castings. The next 12 feet above this consist of larger-grained and less cohesive sand, better adapted for mould for iron castings. The upper part of the Thanet Sand is a sharp white sand. In the lower part of the pit a pocket was observed in the sand containing a current-bedded infilling with clayey partings. Above the Thanet Sand, and separated from it by a pebble layer, come the Woolwich beds, some 20 feet in thickness; these consist of an alternating series of sands with ferruginous concretions, shelly clays and pebble beds. These beds dip and thin out to the west on the slope of the hill on that side, this being due to their having slid down the hill and become hereby drawn out. At the top of the pit the Oldhaven pebble beds are seen.

The shelly clays of the Woolwich series, and the Oldhaven pebble beds, are, however, better seen on the steep face at the east side of the hill, where they abound in fossil shells. These are mostly in fragments, but by careful search good specimens may be found. The most plentiful fossils in the Woolwich beds are two species of *Cyrena* (*C. cordata* and *C. cuneiformis*), and the turreted Gasteropod, *Melania inquinata*; another similar shell, *Cerithium funatum*; and a large species of Oyster (*O. bellovacina*) are also found. The Oldhaven beds yield the same species, and some others, as *Pectunculus plumsteadensis*, and the Gasteropods, *Melanopsis*, *Neritina*, and *Buccinum*.

A substantial tea at Old Charlton village formed a welcome termination to the day; some members of the party afterwards walked across the park to Greenwich, under Mr. T. V. Holmes' guidance and hospitality. In the park specimens of a dark race of Fallow Deer were much noticed, and reminded the Essex visitors of the well-known deer of the Epping woods.

VISIT TO FOWLNESS ISLAND, ESSEX.

SATURDAY, JULY 22ND, 1899.

Conductors:—W. H. DALTON, ESQ., F.G.S., Rev. R. H. MARSH, M.A., and the Hon. Secretaries.

The Meeting was arranged to allow of Members visiting a very curious district of the "Dane-land" of Essex, which is interesting from several points of view. Fowlness Island is, however, difficult of access, and our arrangements necessitated leaving home early in the morning in order to catch the tide; the members travelling down by the train arriving at Burnham at ten o'clock. As the train approached North Fambridge, the sight of many hundreds of acres of arable land under water, enabled the members to realize the disastrous permanent effect of the great tide of November 29th, 1897.

The early arrival enabled the visitors to spend some time in exploring this pretty river-side village, so well known to yachtsman for the safe anchorage in the Crouch. Its pleasantness it may be feared is threatened by the mistaken policy of the railway company in running excursion trains at ridiculously cheap fares, and so bringing into the place people apparently incapable of appreciating its quaintness and quietude.

At about high tide (12 o'clock) the party embarked on the sailing boat "Volunteer," and we steered for the Quay at Fowlness. It had been intended to take a sail in the Crouch Estuary, but the absence of a favourable wind forbade.

Any dredging in the river was, of course, out of the question. A good account (and probably the only one yet published) of the marine zoology of the Crouch River is that given in the two papers by Messrs. E. A. Fitch and Walter Crouch in the *ESSEX NATURALIST* (vol. v., pp. 145-152, and vol. vi., pp. 81-92). At Burnham, on the sea-wall, the large Isopod, *Ligia oceanica*, L. was fairly common, but owing to its quickness in darting into the crevices of the blocks of Kentish ragstone with which the wall is faced, it was difficult to procure specimens. At the Quay on Fowlness, a hunt was made amongst the *rejetamenta* on the edge of the tide for specimens of small molluscs, *Melampus* (*Conovulus*) sp. which Mr. Dalton reported as having been common when he collected on the island some years ago, and a few specimens were obtained.

An excellent cold luncheon had been carried in the boat from the "Royal Hotel"—and was served in a very *al fresco* manner on temporary tables set up by the waiters on the sea-wall!

Many of the ordinary maritime plants were very luxuriant on the seawall and in the "inning" meadows. *Senbiera didyma* (Wart-cress) was abundant on the banks, and *Galium verum*, the Yellow Bedstraw, had evidently been quite a feature in the meadows, although its beauty had past. On the margins of some of the fields the curious globular fruit of the Coriander (*Coriandrum sativum*) attracted the attention of our botanists. The plant was formerly grown by the farmers and now bids fair to establish itself as "a weed of cultivation" on the island.

As the party approached the interior of the island, they were met by the Rector, the Rev. R. H. Marsh, who conducted them over the Church (St. Mary's) a recent structure of the early English style, which was built in 1850, replacing a much earlier church of wood. Mr. Marsh and Mr. Dalton showed two pencil drawings of the old Church, one of which we would have reproduced, but they are somewhat discordant, and it is difficult to decide which is the more correct.

All the ditches in the island appear to contain brackish water, and the inland flora consequently bears a very maritime appearance; bordering some cottages near the Church, the moat is fringed with luxuriant bushes of Tamarisk (*Tamarix gallica*), although we observed none near the coast.

Mr. Marsh most kindly provided afternoon-tea for the ladies in the Rectory garden.

Some time was spent in inspecting the crops of the farms, Mr. Marsh acting as guide, and giving much local information on the methods of agriculture, and Mr. Dalton was indefatigable in imparting knowledge on the geology of the Island, but it is quite unnecessary to give even the substance of his remarks here, as in the *ESSEX NATURALIST* (vol. iii., pp. 239-243) will be found his account of Fowlness (the best extant) and much information is also given in the report of the meeting of the Club at Burnham and Southend in July, 1889 (*l.c.* pp. 277-280). Fowlness, as its name denotes, is celebrated for its sea-loving birds, as the pages of Christy's *Birds of Essex* testify. Many rare fishes are caught on the great Maplin Sands; the curious kettle-nets used here are described in Dr. Laver's book on the *Mammals and Fishes of Essex*.

On quitting the island, the Rector was warmly thanked for his kindness and hospitality, and the return voyage was quickly and pleasantly made. At Burnham, in the evening, tea was taken at the "Royal Hotel" and afterwards an ORDINARY MEETING (the 189th) was held for the election of new members, Dr. Hugh H. Mason in the chair.

The following were elected members:—Mr. F. McIntyre, Mr. Charles D. Makepeace, and Mr. Alfred Cotgreave, F.R.Hist.S. (*Chief Librarian, Municipal Library, West Ham*)

The Chairman congratulated the members on a very pleasant and successful meeting, which might so easily have been spoiled by bad weather. He proposed a vote of thanks to Mr. Dalton for his services as conductor, which had added so much to the interest and pleasure of the meeting.

Mr. Dalton replied, and gave many additional particulars of the geology of Fowlness.

A vote of thanks was also passed to the Rev. Mr. Marsh, the Rector of Fowlness, for his kindness to the party during the day. The meeting thus ended, and the members left Burnham by the 7.40 train, being more fortunate

than the Secretary, who when down at Fowlness, arranging details of the meeting about a fortnight previously with Mr. H. A. Cole, was benighted and had to remain 'till next day!

THE ANNUAL CRYPTOGAMIC MEETING.

FRIDAY AND SATURDAY, OCTOBER 27TH AND 28TH, 1899.

Conductors:—Dr. M. C. COOKE, M.A., LL.D., A.L.S., &c.; GEORGE MASSEE, Esq., F.L.S. (Kew Museum); and Prof. G. S. BOULGER, F.L.S., F.G.S.

The Meeting on the Friday was fixed in the hope that the extra day would allow of specimens being collected for the exhibition on Saturday. But the weather was very bad; only a small party (but including two ladies!) assembled at Loughton at 11 o'clock, and after consultation, decided to brave the wet and carry out the programme. A ramble was taken through Monk Wood and so to the meeting rooms at Theydon, where a very welcome tea awaited the little party. In spite of the rain, the baskets were filled, fungi proving much more plentiful than had been anticipated. Many handsome species were collected, and carried to the meeting-rooms.

Newcomers to our woods marvelled at the brilliant vistas presented by the beechen groves in the last stages of their autumn dress; the rain had varnished the leaves with moisture, and thus revealed their colours with astonishing effect. One of our lady members (Miss Read), a stranger to the forest, who wrote a poetical account of the ramble, thus recorded her impressions of the scene:—

“ The walls of mist had sunk away
To distant haze of purple-grey;
The mossy floor of emerald stain
Was silvered o'er with pearls of rain;
This was the heart-core of the wood
Where smooth-stemmed beeches circling stood,
In autumn's loveliest attire,
A garment woven all of fire.
The rain had washed the dropt leaves clean
Where spread they hid the mossy green;
Above a canopy of flame,
Below, a carpet of the same.
“ And lurking 'neath the fallen trunk
In cleft of bough, in tree-root sunk,
Great groups of fungi one could trace;
While wanron in the open space,
The blood-red Fly-Agarics stood,
The painted beauties of the wood ! ”

The meeting-place on the Saturday was Messrs. Riggs and Sons' rooms at Theydon Bois, where tables were laid out for the reception of specimens and botanical books of reference provided. The weather was a great improvement on the previous day. The sun shone brightly at intervals and there was no rain. The members came down by various trains and the morning and early afternoon were occupied in collecting excursions into the Theydon Woods, Epping Thicks, &c. Fungi were far more abundant than they have been for many years past. Among the birches were large and handsome *Boleti* and many splendid congregations of the scarlet Fly-Agaric (*Agaricus muscarius*) were again observed with admiration. The tables in the meeting-room were quickly loaded with a fine show of specimens, which were examined and identified by Dr. Cooke and Mr. Massee. The general character of the gatherings is indicated by Mr. Massee in his report in the present part of the ESSEX NATURALIST (*ante* p. 166).

The usual Club tea was served early in the evening, and afterwards an ORDINARY MEETING (the 190th) was held, Mr. D Howard, President, in the chair.

The Secretary exhibited the plans and drawings of the cases and other fittings for the Essex Museum of Natural History, to be purchased out of the munificent donation of Mr. Passmore Edwards, who had presented the Museum with £1,000 for this purpose, which was in addition to the £3,000 already given by him towards the erection of the building.

Dr. M. C. Cooke then gave his usual report on the observations of the day, and in doing so, emphasised the fact of the marvellous abundance of Fungi this autumn; such a good season had not occurred in his experience for 10 years past. The list of the species observed that day numbered 134, many of them usually by no means common. [Dr. Cooke has since prepared a complete list of the species gathered, which will be kept in the library for future reference and comparison.] Dr. Cooke also referred to the abundance of the common mushrooms; they had been extraordinarily plentiful in most parts of the country, and fine gatherings had been sold in London for 4d. per lb., a price quite unprecedented.

Dr. Cooke concluded by reading one of his partly humorous and partly pathetic "copy of verses" descriptive of the adventures and delights of previous "Fungus Forays" with the Woolhope Club, and with many allusions to deceased botanists and the plants that puzzled them in days gone by:—

"An old man sate on his study stool,
 Hey ninny, nonny,
 And considered himself a confounded fool,
 Hey ninny, nonny,
 For he dreamt of the past, in years that are gone,
 When friendships were many, and enemies none,
 'Till now he sits perched on his stool all alone;
 Hey ninny, nonny.

"Of rambles and forays, and dinner at six,
 Hey ninny nonny,
 Of bushes of toadstools and pustules on sticks,
 Hey ninny, nonny,
 Of scrambles up Din-dor, or down by the Wye,
 Through Heywood, or Dinmore or Ludlow or nigh,
 By Downton, Stoke Edith, or ——— only a sigh,
 For Hey, ninny nonny!"

* * * * *

Mr. Massee followed with an interesting address on the study of cryptogamic plants, and especially recommended intending workers to take up the less-known minute forms. He offered to give all the assistance in his power, and proposed that a few meetings for the observation of leaf-fungi and other like forms should be held next season, not only in the autumn but also in the spring and summer months. Some of Mr. Massee's observations on this occasion are embodied in his report before referred to.

The President most heartily thanked Dr. Cooke in the name of the Club for his kind and valuable services given at these Fungus Meetings since the first one in October, 1880 (see *Journal of Proceedings*, vol. i., pp. xlviii-liii) and continued almost without break until that present day. The vote was passed by acclamation.

Votes of thanks were also passed to Mr. Massee and Prof. Boulger for their valuable assistance.

Mr. Cole called attention to the many cases of decay and death of Birch trees in Epping Forest, apparently due to some kind of fungoid attack. Mr. Elliott and Mr. Masee spoke also on this subject. Since the meeting our member, Mr. Paulson, has begun to study this matter, and we may look for a report from him at the next Cryptogamic meeting.]

The meeting soon after ended, the members making their way to Theydon Bois station, to catch return trains.

MEETING AT THE MUSEUM OF PRACTICAL GEOLOGY, JERMYN STREET

SATURDAY, DECEMBER 16TH, 1899.

On this afternoon a meeting was held in the Theatre of the Museum of Practical Geology, by the courteous permission of Sir Archibald Geikie, F.R.S., Director of the Museum. Our esteemed hon. member, Mr. F. W. Rudler, F.G.S., the Curator, received the party, and very kindly acted as Conductor throughout the meeting.

The 101ST ORDINARY MEETING was held, as above, at 3 o'clock, Mr. D. Howard, President, in the chair.

The following were elected members of the Club:—Miss Maud M. Biggs, Mr. F. W. Hildyard, F.L.S., Mrs. Hildyard, and Mr. Robert Paulson.

Mr. W. M. Webb, F.L.S., exhibited a species of Woodlouse (Isopoda) new to Britain (*Porcellio ratzburgi*, Brandt) from Warley, Essex. Mr. Webb gave some details of the occurrence of the new species, which also probably occurs at Brightlingsea. The particulars are embodied in Mr. Webb's paper in the last part of the *ESSEX NATURALIST* (*ante* p. 127)

Mr. Rudler then gave a short lecture on "The arrangement of Museums illustrating the Geologic Sciences," accompanying his remarks by the exhibition of a series of new and old maps of the Geological Survey. The main object of the lecture was to give the members some idea of the objects and mode of exhibition of specimens in the collections.

At the conclusion of the meeting Mr. Rudler conducted the party through the Museum, giving many most pertinent and interesting "lecturesses" in connection with the several departments.

Before leaving, at the end of the afternoon, on the proposal of the President, a vote of thanks was very cordially given to Mr. Rudler for his lecture and for his excellent and most instructive demonstrations.

[In the circular calling the meeting the following reference to the late destructive fire at the Municipal Institute, Stratford, was printed. This fire completely upset all the arrangements proposed to be made for the winter meetings of the Club:—

Owing to the disastrous fire at the Municipal Technical Institute at Stratford, on the morning of October 23rd last, the Physical Lecture Theatre (which had been so kindly placed at our disposal during last Session, by the Technical Instruction Committee), was destroyed. Pending the restoration of the building, it is hoped that arrangements for meeting in another room may soon be made, but in the meantime the Council are organising two or three Meetings in the National Museums during mid-winter and spring.

All Members of the Club will deeply regret the terrible misfortune which has overtaken the Institute and Library (probably the finest of their kind in or near London), but it is anticipated that the building will be restored in a year's time. The Natural History Museum most fortunately escaped without injury.]

NOTES ON THE CARNIVORA OF EPPING FOREST.

THE following interesting article appeared in the *Pall Mall Gazette* of December 7th, 1899. The author evidently writes with knowledge of the forest, and some of his remarks are confirmatory of our own observations:—

“ During the past twelve months the Epping Forest Badgers have been developing a great deal of activity. No longer content with their earths close to the keeper’s lodge near the Wake Arms, where they share their homes with rabbits and foxes, they have made new excavations and formed a colony at a point nearly two miles nearer town, that is to say, in the old Loughton camp on a rising at the back of the Robin Hood. A favourite path goes within a yard or two, and close to the openings is a fallen tree trunk on which ‘talking age and whispering lovers’ have long been used to rest, but the badgers pay no heed to what goes on by day, and have the place all to themselves at night. They have made a considerable number of new earths, so that they appear to have come in force. Some naturalists hold that when the stronghold gets too crowded, the tough old parents set upon their offspring and drive them away. At times, too, they get weary of their house-mates, the foxes, and once or twice dead cubs have been found outside the earth. They do not seem to molest the rabbits, except during the breeding season, when they esteem the young an irresistible dainty. As is well known, the doe rabbit does not make her nest in the family burrow, but scoops out a ‘stop’ or small hole near the surface not much longer than a man’s arm. The badger is able to judge the position of this with great accuracy, and instead of laboriously digging the nest out in all its horizontal length, pierces it with a tiny perpendicular shaft. In spring, the present writer, in company with a very accomplished naturalist, found several of these harried stops in the open space below Fair Mead. There was the mouth of the stop, the hole out of which the badger had drawn the tiny rabbit with his paw, and lying about the ‘fluck’ which the mother uses for her nest. Those who know what a common resort this green open space is will wonder no less that the doe should make choice of it than that badgers prowl about there by night, stumbling as they must over empty lemonade bottles and seeing sandwich papers lying about. But there is the most certain evidence, not only of this, but that on Chingford Plain—home of merry-go-round and highflier—the Roedeer and Fallow-deer, the Fox, Badger, and Rabbit roam at night.

“ The importation of badgers has been so pronounced a success that attempts have been made to introduce other animals that seem to be growing extinct elsewhere. The most interesting of these is that beautiful creature the Pine-martin. One was shot near Loughton in 1853,¹ and that was the last killed in Essex, although as late as 1883² a trustworthy observer reported that he had seen one. At present they seem to be less nearly extinct in Cumberland than elsewhere, and it having become known that a

¹ See J. E. Harting, *Trans. Essex Field Club*, vol. i., p. 95.—ED.

² The writer evidently refers to the late Mr. English’s observation of one seen in the Forest, near Ambresbury Banks, on July 20th, 1883. See *Journ. of Proc. Essex F. C.*, vol. iv., p. liv.—ED.

gentleman of that county has been successful in breeding them in confinement, he was recently asked to supply a pair for the Forest. Unfortunately, at the moment he possesses only two females, though he has seven in all, and is naturally reluctant to part with one, as that would materially injure his chance of rearing more; but at a future time he may be able to comply with the request. There is a fair prospect of the martin becoming once more a tenant of the woods. Another rare animal that used to be not uncommon here and is now extinct is the Polecat.³ Two were recently offered, but they are so destructive that, after due consideration, it was decided not to have them. At present the woodland is thronged with bird and beast. In the twenty odd years during which the Forest has been public property and under protection, the timber and undergrowth have vastly improved and now afford abundant cover. In consequence the emigrant song birds resort thither in vastly increased numbers; there are more thrushes, blackbirds, robins, bullfinches, gold-crests and other familiar home-birds. Even the broods of pheasants last season would not have shamed a game-preserve. One would not like to see a devouring polecat introduced among them. Already there is a large number of Stoats in the Forest; one sees them everywhere, but especially about Connaught Water, where, but for them, the rabbits that breed under the impenetrable thickets would overrun everything. If any further check were required on the multiplication of birds it would be supplied by the Weasel and large Brown Rats, of which there are more than enough. I do not know if the accomplishment be peculiar to the Forest stoat, but on being chased by a dog, or otherwise startled, he will sometimes run up a tree with the agility of a cat, or of one of the squirrels that enjoy a happy time here under the new régime. Twenty years ago they were considered to be almost extinct."

³ We have it on very good authority, that the Polecat is still occasionally seen in the woody country (some of it within the forest district) bordering the Lea Valley.—Ed.

NOTES—ORIGINAL AND SELECTED.

ZOOLOGY.

MAMMALIA.

Otters in Essex.—There may be two views of the question referred to on page 141 *ante* where the otter hunter is condemned with all his ways! Fox hunting alone causes the protection of our foxes, save perhaps in the forest; may we not by analogy anticipate that otter hunting will indirectly tend to increase the supply of this charming tenant of some Essex waters? Fishermen who haunt the lovely trout streams of the west complain loudly of the depredating habits of the otter, but in the sluggish streams of Essex, fishing is perhaps of less consequence. Otter hunting may be so regulated as to increase rather than exterminate the breed, and shooting otters may someday lead to social disgrace as shooting foxes does now in the world of sport.—I. C. GOULD, Loughton.

Fox v. Ferret.—"On Friday, Dec. 15th, 1899, some ferreting was going on, on a marsh about a mile on the Colchester side of Brightlingsea close to the railway. The keepers heard a curious sort of barking going on inside the burrow—a strong one—when out bolted a strong old fox with a ferret on his back; as he raced towards the Upland woods the ferret loosed hold, and 'tis probable that this same fox will be cautious in future about lodging in a rabbit earth."—*Essex Standard*, December 23rd, 1899.

Supposed Occurrence of *Delphinus tursio*, Fab., (the Bottle-nosed Dolphin) off the Maplin Sands.—A somewhat mysterious animal was announced in the London evening papers of June 19th as a "Bottle-nosed Whale near Southend." We at once wrote to our local member, Mr. F. G. Whittle, F.E.S., for information, but he was unable to find the fisherman Gundy, the captor of the reputed whale, who was away in his boat. Mr. Whittle, however, furnished us with a copy of the *Southend Observer* of June 22nd, which afforded some information. The animal was captured off the Maplin Sands, and was brought by Gundy to the beach at Shoeburyness. The reporter writes that "after a walk of about a mile along the Southchurch Beach we came across a canvas enclosure by the side of Mr. Grundy's boat. Upon a board hanging outside there was an announcement to the effect that for the sum of 2d. a whale would be seen; and within the enclosure, with the sand still moist from the receding tide, a large aquatic animal lay full length in the skiff. It was dead, although it had lived for about twenty hours after it was captured. 'This is a bottle-nosed whale from the Mediterranean,' said Mr. Grundy, with the air of a practised showman. 'I caught the animal in my net, and it gave us a bit of trouble; but I managed to tow it in, and here it is. I sunk the skiff under the whale, hoping to keep it alive when I got it ashore, but it lashed about with any amount of fury, splashed its blood all over the place, and died.'

"Putting the tape over his capture, he found it measured 11ft. in length and 5ft. 11in. round the centre of the body. Its heavy tail was in the reverse position to that of an ordinary fish's, and would be horizontal when the animal was in the water. It was almost black on the back, breaking into silvery white on the stomach, and its bottle-nosed head showed the existence of a powerful jaw and two ugly rows of sharp teeth." This description applies fairly well to *Delphinus tursio*, which is found occasionally from the Mediterranean to the North Sea. Dr. Laver says that it has occurred off Essex several times within his own observation, and with the porpoise may be considered as a regular visitor, but as the Southend specimen was not seen by a competent naturalist we can only record the facts as we have them. Mr. Whittle could not learn what eventually became of the animal.—Ed.

PISCES.

Conger Eel (*Conger vulgaris*) at Walton-on-Naze.—According to the *Essex Standard* a large Conger Eel was caught off the beach at the end of the week ending December 16th (1899) by a man named Newman, who was employed in the new sea-wall works. The fish measured 6 feet 6 inches in length and 23 inches in girth, and weighed 63 lbs. It was seen floundering in shallow water and was captured with a boat-hook. It was subsequently cut up and sold at 7d. per lb. The Conger is by no means a frequent visitor to our shores.

CRUSTACEA.

Old Oysters attached to Crabs.—In the *Field* for November 25th, 1899, Mr. George Hunt, Orford, Suffolk, writes:—"When fishing on Saturday last with a seine net in Hollesley Bay I caught a hen crab, and on its back was a four-year-old oyster. After making inquiries of all the old inhabitants and fishermen, I cannot find a case of the same kind occurring before, so think it may possibly interest some of your many readers. The

crab weighs 2½lbs. I have presented the pair to the Ipswich Museum." In the next week's issue, Mr. R. Aldous, of Brightlingsea, Essex, writes:—"I have in my possession a crab which has upon its back shell eight oysters of from 2in. to 2½in. across their shells. This crab was caught on the oyster grounds of Tershilling, in the North Sea, by one of the Brightlingsea oyster smacks. Oyster experts pronounce these oysters to be two years old." On these observations the Editor of the *Field* remarks:—"It is generally supposed that crabs and lobsters moult their shells annually, as the only means by which they can increase in size. If the age of the oyster referred to by Mr. Hunt was accurately judged at four years, or, as in Mr. Aldous' example, at two years, it would go to prove either that crabs do not moult annually, or that an oyster is able to detach itself from the object to which it first became attached, a feat which most people would regard as an impossibility."

BOTANY.

Symphytum officinale. var. *patens*, Sibthorpe, at Brentwood.—On reading one of the back numbers of the *ESSEX NATURALIST* (vol. x., p. 401) I saw that the purple-flowered form of *Symphytum officinale* is spoken of as not then to be claimed as an Essex plant. Very likely, however, it has been found in the county since, but in any case it may be of interest to you to know that in a field close by here, there are several plants of it. It grew so luxuriantly last year (1898) that, though cut close to the ground about the end of June as it overran the crops, by August I found some of it in flower again. The pale yellow form was found in a ditch near East Horndon. I send a specimen of each form for the Club's Herbarium, but I am sorry to find that brown stains have appeared in the flowers; it seems impossible to avoid them.—(Miss) AMY M. HORTON, "Mascalls," Brentwood, December 11th, 1899.

Notes on Essex Plants.—Possibly the following notes on some plants mentioned in the last part of the *ESSEX NATURALIST* (*ante* pp. 146-7) may be of some interest:—

Buflerum rotundifolium is erratically abundant in our district. I have it noted in my local register as occurring in fields at Stebbing, Lindsell, High Easter, and the Roothings. Wherever it occurs it is I think in these localities, abundant.

Epipactis latifolia.—I have this noted down for woods and springs at Felsted, High Easter, and Dunmow, but occurring sparingly.

Lemna gibba—Dunmow and High Easter.

Lemna polyrrhiza.—Felsted and Little Leighs.—(REV.) EDWARD GEFF, M.A., School House, Felsted.

Epipactis latifolia, Sw. — (*Ant.* p. 147). This plant used to grow on both banks of the Ching brook between Whitehall Road and Chingford Hatch, Epping Forest, but I have not seen it since the early eighties. I do not remember the particular sub-species to which the plants I observed belonged.—F. W. ELLIOTT, Buckhurst Hill.

GEOLOGY.

Saline Constituents of Chalk-derived Waters in Essex.—At the meeting of the British Waterworks Engineers in London, on June 5th, 1899, our member, Dr. J. C. Thresh, Medical Officer of Health to the Essex County Council, read a very interesting paper under the above title. Dr. Thresh

began by suggesting that scientific records should be prepared and kept of all wells and springs yielding large supplies of water. In Essex, where the supply was chiefly dependent upon deep wells, and where the water varied so extraordinarily in character, a record of this kind was of such importance that he had been accumulating data for several years past. The chalk underlay all portions of Essex. Most of the waters were exceedingly soft, but there was much variation. They all contained much less carbonate of calcium (chalk) than waters taken from the chalk elsewhere. What was the source of the carbonate, sulphate, and chloride of sodium? And what had reduced the hardness of the water or removed so much of the calcium and magnesium salts which were found in all other chalk waters? His view was that this water was practically stagnant under the county, and that in the course of ages the action between the water which entered on the west from the chalk outcrop, and the sea water which entered on the east from the opposite outcrop under the ocean, had resulted in the formation of these particular constituents. On both the south and east, wells had been sunk into the chalk and abandoned on account of the brackish character of the water obtained. The normal water level in these wells was now below ordnance datum, and was sinking from 1 ft. to 2 ft. every year. Everything appeared to indicate that very little of this water came from the outcrop to the west, and such being the case, the multiplication of deep wells would continue to reduce the water level, and sea water would travel inland at a rate faster than the reactions which had produced the saline constituents of the water now in the chalk could keep pace with, and the supply would gradually become brackish. He could discover no indications of this alkaline water travelling in any direction, and, in his opinion, it was a vast and practically stagnant underground reservoir which, if drawn from, was much more likely to be fed with sea water from the east than by the rainfall on the outcrop to the west. The river water entering the chalk at or near Barking underwent some change before arriving at the wells, since the deeper well yielded a water containing no calcium sulphate, and in both the proportions of the various salts differed considerably from those in Thames water. At Greys the wells yielded no sulphate of magnesia, while common salt and chloride of magnesium, the chief constituents of the tidal water, were increasing. At Orsett the water contains both these salts. Such great variation over so limited an area points to a condition approaching stagnation. The water was imprisoned here. It passed from Kent under the Thames towards Essex, but, finding no outlet towards the north, it was forced through fissures into the bed of the Thames. Excessive pumping might reduce the level of the water at the Essex side, so that water from Kent, or even from the river, might flow in to restore equilibrium. Certain of the wells at Barking yielded a water containing carbonate of sodium, and resembling that found under Central Essex, and possibly any little flow that existed of this water was in the direction of Barking. The water level in these wells, however, had fallen with such extraordinary rapidity during the last two years that it could not be long before the pressure from the Thames side would make itself felt by the influx of calcium and magnesium salts, since the chalk near the Thames was admittedly infiltrated with river water. This over-pumping from the chalk in the South of Essex was likely to have very serious consequences, for the continued depression of the water level below that of the sea will lead to infiltration of sea water on the east and of tidal water on the north and south.

METEOROLOGY.

RAINFALL AND TEMPERATURE IN ESSEX IN 1899.—As usual, annually we now present records from some observers in Essex for the past year. Records for 1898 will be found in E.N., vol. x., pp. 413-416:—

Ramsey, near Harwich.—Miss K. Hempson, Hill House, Ramsey (about 3½ miles west of Harwich) again kindly gives the rain measurements for her station, which may be compared with those for 1898 printed in E.N., vol. x., p. 415. The gauge is 5 inches in diameter, 6 inches from ground, and 150 feet above sea level.

		RAINFALL FOR 1899.			Greatest fall in	
	Inches.	No. of days on which	rain fell.		24 hours.	
January	.. 1.98	..	18	..	Jan. 13th, 15th..	.32
February	.. 1.53	..	11	..	Feb. 15th ..	.56
March..	.. .85	..	0	..	March 25th ..	.42
April ..	.. 2.00	..	19	..	April 9th ..	.26
May ..	.. 1.92	..	12	..	May 14th ..	.53
June ..	.. 1.48	..	7	..	June 30th ..	.70
July ..	.. 2.03	..	8	..	July 25th ..	.70
August	.. .58	..	8	..	August 16th ..	.17
September	.. 2.32	..	12	..	Sept. 29th ..	1.12
October	.. 1.95	..	11	..	Oct. 27th ..	.74
November	.. 3.19	..	10	..	Nov. 3rd ..	1.10
December	.. 1.68	..	16	..	Dec. 5th ..	.31
	21.51		141			

Lexden, near Colchester.—Mr. S. F. Hurnard again records as follows the monthly totals for rainfall at Lexden. "They were as before measured by a 5-inch. Snowden Gauge. I add also a brief note on the general weather of each month."

Month.	Total.	Remarks.
January ..	1.80	Mild and stormy till 23rd, then colder.
February	1.31	Mild till 20th, then frosty and bright.
March ..	.80	Very cold. Fine and bright.
April ..	1.52	Changeable, but cold and dull.
May ..	1.49	Many cold nights and few warm days
June ..	1.43	Rather cold, showery after 17th.
July ..	2.55	Beautiful month, bright and hot.
August ..	.34	Very hot and sultry.
September	2.31	First week hot, then cold and dry till 27th
October ..	1.84	A cold, dry month, till 25th.
November	3.31	Mild, open weather, little fog.
December	1.37	Cold spell 10th to 16th. Dull and mild.

Total 20.43 inches for the year.

On three days the rainfall exceeded 1 inch, viz., July 23, fall of 1.50; Sept. 29th, fall of 1.25; and Nov. 3rd, fall of 1.14.

There were three periods exceeding 14 days of absolute drought, viz., Feb. 19th to March 7th, 17 days; May 25th to June 17th, 24 days; July 27th to August 14th, 19 days. Also periods of 19 days and 20 days in October and November, broken by falls of .05 and .02 respectively.

Fingringhoe.—Mr. Thomas B. Grubb very kindly communicates the following interesting summary of the weather at his farm, four miles S.E. of Colchester (see *ESSEX NATURALIST*, vol. x., p. 238 and p. 414 for records in 1897 and 1898):—

The year came with mild open weather, January gave us nearly an average rainfall but the land never got really wet, and tillage operations were but little hindered.

Grass lands were quite green at the close of the month. The downfall in February was less, and the weather somewhat colder. Barley and oats were sown towards the close of this month on light land. March proved a dry month and remarkably cold, the thermometer falling well below the freezing point in the screen, on 19 nights; while boys were sliding on our ponds and ditches on *Lady-Day* (25th inst.). April was somewhat ungenial, with a rainfall about equal to the mean in this district, while in May the fall was less, with temperature still low for the season, and but little sunshine, so that the close of this month found vegetation somewhat backward, the mangold plant in particular being very slow in coming to the hoe. June brought a great change, with fine sunshine and heat the first 18 days, and all crops made rapid progress; but spring corn was wanting the rain badly, when it came on the 19th and 20th. The remainder of this month and the first four days of July were unsettled and showery.

The total rainfall for June was only about half the average, and scarcely sufficient for crops on the lighter soils. The hay crop was barely an average one, and was somewhat hindered in the carting up to July 4th, but all secured after that date could be stacked in prime condition. July proved hot and dry after the 4th, and but for the heavy thunder rain on 23rd the feed and root crops would have been severely punished, as they were in many other parts of the kingdom, where the rain on that date was of only trifling amount.

The writer began harvest on July 25th, somewhat in advance of many, but had no reason to regret having been so forward, as the crops ripened remarkably quickly, and a good deal of loss of grain by shelling occurred in those fields that were left too long. August was a grand harvest month, almost rainless, with the exception of a thunder shower on 15th, and a little further fall at its close. Drought continued through September, the first rain of sufficient volume to make the ploughing of grass and clover lands practicable, falling on the afternoon and night of the 29th. The bulk of the rain in October fell near its close, the 27th and night following giving considerably more than half of the total quantity registered. The first week in November was very wet, so wet as to make mangold carting almost impossible for a time, but as there was no frost this month, and as weather after the 10th inst. came dry, the delay hereby occasioned had no serious consequences. The mangold crop proved a heavy one, and the turnips and kohlrabi improved very much after the Michaelmas rain, so that what looked in September like a light deficient root crop, proved by the middle of November to be a fairly abundant one.

December was mild till the 7th when a sudden fall of temperature took place, and sharp frost prevailed till the 17th, the remainder of the month being characterised by changeable weather, with alternate frosts and thaws. Below will be found details of rainfall and temperature, taken daily:—

	Rainfall	..	Max.	Temperature.		Mean.	
				..	Min.		
January	1·78	..	45·61	..	36·52	..	41·06
February	1·32	..	45·64	..	35·46	..	40·55
March	·83	..	46·97	..	30·77	..	38·87
April	1·82	..	54·30	..	40·10	..	47·20
May	1·37	..	58·10	..	41·97	..	50·03
June	·98	..	67·43	..	49·47	..	58·45
July	3·08	..	71·81	..	56·48	..	64·15
August	·77	..	70·61	..	54·07	..	62·34
September	2·30	..	63·93	..	49·53	..	56·73
October	1·71	..	54·29	..	42·61	..	48·45
November	3·28	..	50·61	..	40·00	..	45·30
December	1·58	..	39·65	..	32·52	..	36·08
Total	20·82		Mean for the Year	..	49·10		

Rain fell on 128 days ; heaviest rainfall in 24 hours, 1·46 on July 23rd.

Danbury.—The Rev. J. Bridges Plumtre, Rector of Danbury, reports:—
‘ The total for the year shows that we have had about the average amount of rain, and yet the number of days on which rain fell is by no means high. From the point of view of the rainfall, I think that last year may be marked as a favourable one, so far as this locality is concerned.

The gauge is one foot above the ground, and 365 feet above sea-level ; the diameter of funnel five inches :—

Month.	Total Depth. Inches.	..	Greatest fall in		Date.	Number of days on which 0·1 or more fell.	
			24 hours	Depth.			
January	1·69	..	·32	..	15th	..	20
February	1·54	..	·30	..	8th	..	12
March	·64	..	·28	..	25th	..	8
April	2·31	..	·63	..	16th	..	21
May	1·42	..	·38	..	14th	..	11
June	1·69	..	·77	..	30th	..	8
July	3·26	..	2·09	..	22nd	..	11
August	1·61	..	·78	..	15th	..	8
September	2·30	..	1·15	..	29th	..	15
October	1·90	..	·74	..	27th	..	13
November	3·20	..	1·14	..	5th	..	7
December	1·39	..	·32	..	5th	..	17
Total	22·96		—		—		151

During the year 1899 there were three absolute droughts, viz. : (1) Feb. 18th to March 7th, 18 days ; (2) May 25th to June 17th, 24 days ; (3) Nov. 11th to Nov. 30th, 20 days.

The total rainfall is exactly seven inches more than in 1898.

Chelmsford.—Mr. F. Chancellor sends the monthly totals for rainfall at Chelmsford. The total for the year (1899) was nearly half an inch above the average :—

January	..	..	..	1'93
February	..	..	..	1'59
March	..	..	..	0'85
April	..	..	..	2'26
May	..	..	..	1'39
June	..	..	..	1'70
July	..	..	..	3'21
August	..	..	..	1'19
September	..	..	..	2'55
October	..	..	..	2'11
November	..	..	..	3'27
December	..	..	..	1'42
Total	..	..	..	23'47

Terling.—The Rev. C. Boutflower, M.A., of Terling Vicarage, has sent the following record of rainfall at that place during 1899:—

January	..	..	..	1'97
February	..	..	..	1'68
March	..	..	..	1'00
April	..	..	..	2'11
May	..	..	..	1'93
June	..	..	..	1'29
July	..	..	..	3'26
August	..	..	..	'97
September	..	..	..	2'94
October	..	..	..	2'26
November	..	..	..	3'86
December	..	..	..	1'52
Total	..	..	..	24'79 inches.

Braintree.—The following are the monthly totals as observed at "Fennes," near Braintree, by Mr. H. S. Tabor:—

Month				Total Depth Inches.
January	..	..	..	1'81
February	..	..	..	1'24
March	..	..	..	'86
April	..	..	..	2'15
May	..	..	..	2'21
June	..	..	..	1'31
July	..	..	..	3'88
August	..	..	..	'75
September	..	..	..	2'02
October	..	..	..	1'71
November	..	..	..	2'97
December	..	..	..	1'27
Total	..	..	..	22'28

Mr. Tabor remarks, "1899 was the seventh year in succession during which the rainfall was below the average."

The Weather in 1899.—The characteristics of the weather in the United Kingdom, and particularly in the London district, was thus summarised in the *Standard*:—

“The principal features of interest of the year, from a meteorological point of view, have been the small amount of rain in the summer months and the persistent high temperatures which have so commonly prevailed throughout. Wind storms were seldom experienced, and those which occurred over our Islands were not, for the most part, severe, while in the summer, considering the spell of hot and dry weather, thunderstorms were of rare occurrence. At the commencement of the year the weather was particularly rough in the North Atlantic, and many liners were damaged or delayed, while several steamships were posted as missing. Over our own Islands, the weather at this time was exceptionally mild, and floods occurred in many parts in consequence of the heavy rains. The aggregate rainfall for the year was deficient over the whole of England, the deficiency amounting to 6in. in the Channel Islands, 5in. in the south of England, and 4in. in the east and south-west of England. There was a slight excess in most parts of Scotland and Ireland. The mean temperature for the year was in excess of the average over the whole area of the British Islands, the excess being greatest over the southern portion of the Kingdom, although it was also very large in the north of Scotland. There was an excess of sunshine over the entire country, amounting to about 350 hours in the south of England and exceeding 200 hours over the whole of England, except in the north-eastern district. In Ireland the excess was about 150 hours, but in parts of Scotland it was not very large.

“In the *neighbourhood of London*, as shown by the records at Greenwich the total rainfall for the year was 22·1in., which is 2·4in. less than the average, and during the last 17 years there have only been three years with an excess. It was deficient in eight months, the driest month of the year being August, with a total measurement of 0·35in., which is the driest August for at least 60 years. During the three summer months there was a deficiency of rain exceeding 4in. The only months with an excess of rain were January, February, April, and November; and, except in the two latter months, the excess was unimportant. Rain fell on 143 days during the year, the largest number of wet days occurring in January, when there were as many as 22; and this was closely followed by 20 rainy days in April. September and December are the only other months with more than twelve rainy days. During the whole of the three summer months rain only fell on 18 days.

“The mean temperature for the year at *Greenwich* was 51·3 deg., which is 1·8 deg. above the average of the 50 years from 1841 to 1890. There were eight months with an excess of temperature, and in July, August, and November it was more than 5 deg. Of the four months with the mean temperature below the average, there was no month with a larger deficiency than 1 deg., except December, when it amounted to 3 deg. The warmest month was July, with a mean of 67 deg.; the coldest December, with a mean of 37 deg. The absolutely highest temperature during the year was 90 deg., on August 15th, and the lowest was 19 deg., on Dec. 16th, giving a total range of 71 deg. for the year. One of the most exceptional temperatures for the year occurred on September 5th, when the shade reading was 87 deg., and the mean for the whole day was 13 deg. in excess of the average. The largest range in any month was 50 deg., in September, the least was 26 deg., in

January. The temperature was above the average in the Metropolis on 213 days during the year, and below the average on 152 days. There were as many as 29 warm days in August and 20 or more in January, July, September, and November. May, October, and December were the coldest months, there being in each of these 20 or more cold days."

MISCELLANEA.

Waltham Bells.—In the extract from Mr. Bramley's paper, "Walton's Favourite River," quoted on page 140 *ante*, is a sentence which perhaps should be corrected.

Robert Fuller, the last Abbot (who surrendered the abbey and all its possessions on March 23rd, 1540) was not the author of the saying about Waltham bells. Thomas Fuller, curate of Waltham, in his *History of Waltham Abby in Essex*, 1655 (p. 14), noted sundry payments made in the year 1542.

"*Item.* Paid to the Ringers at the coming of the King's Grace, sixpence."

To this Thomas Fuller adds:—

"Yet Waltham Bells told no tales every time: King Henry came hither, having a small house in Romeland to which he is said oft privately to retire, for his pleasure."

I. C. GOULD, Loughton, Jan., 1900.

The Hopefulness of Science.—"Looking back, then, in this last year of the eighteen hundreds, on the century which is drawing to its close, while we may see in the history of scientific inquiry much which, telling the man of science of his shortcomings and his weakness, bids him be humble, we also see much, perhaps more, which gives him hope. Hope is indeed one of the watchwords of science. In the latter-day writings of some who know not science, much may be read which shows that the writer is losing or has lost hope in the future of mankind. There are not a few of these; their repeated utterances make a sign of the times. Seeing in matters lying outside science few marks of progress and many tokens of decline and decay, recognising in science its material benefits only, such men have thoughts of despair when they look forward to the times to come. But if there be any truth in what I have attempted to urge to-night, if the intellectual, if the moral influences of science are no less marked than her material benefits, if, moreover, that which she has done is but the earnest of that which she shall do, such men may pluck up courage and gather strength by laying hold of her garment. We men of science, at least, need not share their views or their fears. Our feet are set, not on the shifting sands of the opinions and of the fancies of the day, but on a solid foundation of verified truth, which by the labours of each succeeding age is made broader and more firm. To us the past is a thing to look back upon, not with regret, not as something which has been lost never to be regained, but with content, as something whose influence is with us still, helping us on our further way. With us, indeed, the past points not to itself, but to the future; the golden age is in front of us, not behind us; that which we do know is a lamp whose brightest beams are shed into the unkuown before us, showing us how much there is in front and lighting up the way to reach it. We are confident in the advance, because, as each one of us feels that any step forward which he may make is not ordered by himself alone and is not the result of his own sole efforts in the present, but is, and that in large measure, the outcome of the labours of others in the past, so each one of us has the sure and certain hope that as the past has helped him, so his efforts, be they great or be they small, will be a help to those to come.'"
--SIR MICHAEL FOSTER, Address to British Association at Dover, 1899.

THE
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"The book before us deals with the Vertebrates, other than the birds, of the county of Essex; and we may congratulate the Field Club of the county on the charming little work its Vice-President, Mr. Laver, has produced under its auspices, and may hope that so attractive a book may influence other Essex naturalists to take up the study of the groups it treats of . . . More than half the book is devoted to Mammals, and Mr. Laver has given us a number of interesting notes on the habits and local distribution of the smaller members of the class, as yet so insufficiently studied from the field naturalist's point of view. This seems to be the most original part of the work, not depending, as so much of the remainder necessarily does, on 'records,' but on the author's personal observations, and the qualities here shown lead us to hope that we may see further contributions from his pen in this direction . . . A last word of commendation may be said for the printing, get up, and arrangement of the book, while many of Mr. Henry A. Coles' illustrations, notably the 'Badger-earth, Epping Forest' (p. 42), are quite charming."—T. O., *Natural Science*, August, 1898.

"In respect of physical conditions Essex is one of the most favourably situated of the eastern counties of England for the possession of a large local fauna, its inland districts presenting variety of station, while it has a large sea-board, forming an estuary into which discharge several more or less important rivers. Indeed, were it not for the pollution of the Thames, the fish-fauna of the county would be even larger than is at present the case, and would reckon among its constituents the lordly salmon itself. Among other special advantages, from a naturalist's point of view, the county includes Epping Forest, which, under its present excellent administration, forms a sanctuary for wild creatures of many kinds. And, in addition to its natural advantages, Essex is fortunate in possessing a Field Club, which includes in its working roll many naturalists of high capacity. It is to a member of this club that we owe the present contribution to a knowledge of the fauna of the county . . . The volume is illustrated with several photogravures, all of which are excellent from an artistic point of view, while several afford interesting glimpses of local scenes. If it be regarded merely as a stepping-stone towards fuller treatment, the work may be welcomed as indicating the recognition of the importance of treatises on our local British faunas."—R. L., *Nature*, July 14th, 1898.

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N.B.—The above two works, forming a complete guide to the VERTEBRATE FAUNA OF ESSEX, will be sent (to Members of the Club only) for 12s., post free, if ordered together.

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The Secretaries beg to give notice on behalf of the Council that *on and after the 1st of May next*, the HEAD QUARTERS and PUBLISHING OFFICE of the Club will be at the "Essex Local and Educational Museum of Natural History of the Essex Field Club" (*Passmore Edwards Museum*) THE ROMFORD HIGH ROAD, STRATFORD, ESSEX.

All books for the library, specimens for the Museum, &c., should then be sent to the above address. Letters for the Secretaries may still be sent to Buckhurst Hill, or to the Museum. Specimens, books, &c., intended for the "Epping Forest Branch Museum of the Essex Field Club," may be sent to *Queen Elizabeth's Lodge, Chingford, Essex*; but no perishable specimens should be sent there, but to the Head Quarters, where the Curator's workroom is established.



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BEING THE JOURNAL

OF THE ESSEX FIELD CLUB.

EDITED BY WILLIAM COLE, F.L.S., F.E.S.,
Honorary Secretary and Curator.

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ADDITIONS TO THE PALÆOLITHIC FAUNA OF THE UPHALL BRICKYARD, ILFORD, ESSEX.

By J. P. JOHNSON,

(Formerly Hon. Curator, Geological and Palæontological Sections, Dulwich College
Museum).

IN a previous paper¹ read before the Essex Field Club, my friend Mr. G. White and I described some new sections which had then been opened on the site of the famous Uphall Brickyard. As a result of long and careful collecting from these sections, we were able to add twenty-one mollusca, two of which are extinct in Britain, and a rodent that is no longer a resident of this island, to the known fauna of the Uphall beds. Since then I have continued the work of investigation in the hope of still further adding to our knowledge of these beds, and have met with a fair measure of success.

At the time the above-mentioned paper was submitted, the first pit had already been filled in, but the second, which was situated in the angle between Cecil Road and Ilford Lane, was kept open until quite recently.

Although the pit had then been cut back a considerable distance, the section had not appreciably altered. It still showed subangular flint gravel, with a few shells, passing upwards into a fossiliferous bed of sand, the bed (b) of the accompanying section, by S. V. Wood, of the old brickyard reproduced from the *Geological Magazine*, vol. iii. (1866).² Foreign materials were conspicuously abundant, and I recognised among them pebbles of white quartz and of liver-coloured quartzose sandstone from the Bunter Conglomerate, of mottled quartzite of the kind found in the Blackheath Pebble-bed, and of flint derived from the Kentish Tertiaries. Above this stratified deposit is a considerable thickness of modern *débris* containing articles of all ages, from Neolithic implements to Nineteenth Century crockery.

On washing a large sample of the sand I obtained several examples of a species of Ostracoda, which Mr. D. J. Scourfield has kindly identified as *Herpetocypris reptans* (Baird). It has not been previously recorded from the Pleistocene deposits of Ilford, but it is still living in the neighbourhood.³

1 J. P. JOHNSON and G. WHITE.—“Some new sections in, and contributions to the Fauna of, the River Drift of the Uphall Estate, Ilford.” *ESSEX NATURALIST*, vol. xi. (1899), pp. 157-160.

2 The Editor is indebted to the courtesy of Dr. Woodward for the use of this block.

3 D. J. SCOURFIELD.—“The Entomostraca of Epping Forest, part iii.” *ESSEX NATURALIST*, vol. 10 (1898); also “The Entomostraca of Wanstead Park,” *Journ. Quekett Micro. Club* ser. 2, vol. v. (1893).



Section exhibited by the Uphall Brickfield, Ilford (from the *Geological Magazine*, vol. iii. (1866), page 60. The following is Mr. Searles Wood's description of the section:—"a Clayey Brickearth, principally derived from the London Clay, containing freshwater shells; b Bright yellow sand; also containing freshwater shells; c Thames gravel d, Warp [? Soil, Whitaker.] The asterisks to the west of section denote potholes formed by denudation anterior to the deposit of c. The asterisk to the east of section indicates the place whence the remains of *Elephas primigenius* (described at vol. i., p. 241. of *Geol. Mag.*) were extracted."

The other additions to the fossil fauna of the Uphall Brickyard will be indicated throughout this paper by an asterisk (*).

I am able to list no less than eleven additional land and freshwater mollusca, thus bringing the total number from these sections up to forty-eight. They are:—

- * *Agriolimax lacvis* (Müll.) ?
- * *Vitrea nitidula* (Drap.)
- Hygromia hispida* (Linn.)
- * *Vertigo pusilla* (Müll.)
- * *Succinea putris* (Linn.)
- * *S. oblonga* (Drap.) v. *clongata* (Braun.)
- Planorbis lineatus* (Walker).
- Pisidium fontinale* (Drap.)
- v. *henslowianum* (Shepp.)
- v. *pulchellum* (Jenyns).
- * *P. milium* (Held.)
- * *P. pusillum* (Gmel.)

There are now only six records which I am unable to confirm, viz.:—*Unio pictorum* (Linn.), *Bythinia leachii* (Shepp.), *Planorbis albus* (Müll.), *Planorbis cornuus* (Linn.), *Pyramidula ruderata* (Stud.), *Vitrea fulva* (Müll.) Specimens of the first three are preserved in the British Museum (Natural History) and in the Museum of Practical Geology, but no examples are known of the remaining shells, which, however, all occur in other Pleistocene deposits in this country. *Pyramidula ruderata* is the most interesting, for although it has a wide distribution at the present day on the mainland of Europe, it is no longer an inhabitant of Britain, where it is very rare as a fossil, one or two from Copford and Clacton, and a single example from Barnwell being the only specimens extant.

The occurrence of *Succinea clongata* is noteworthy, as it has not previously been recorded from this island, either fossil or recent, though it is still living on the Continent.⁴

⁴ See C. L. F. SANDERGER, *Die Land und Süsswasser Conchylien der Vorwelt*, where the shell is figured.

I have obtained two more examples of *Helix hortensis*, and additional granules of *Arion ater*. Also several specimens of the *Helicella*, provisionally referred to in the previous paper (*op. cit.*) as a variety of *H. itala*. It may be described as combining the spire of *H. virgata* (Da Costa) with the umbilicus of *H. itala*.

The list of mollusca from the Uphall Brickyard is now so exhaustive that there only remain eleven more⁵ to complete the list from the Ilford district. One of these, however, *Pisidium astartoides* (Sandb.), is totally extinct: it is a common form in the Pleistocene deposits of the Thames Basin, and further research would undoubtedly add it to the Uphall beds.

On one occasion I found a couple of the pharyngeal teeth of a fish, together with the humerus and molar of a small vole, which I submitted to Mr. E. T. Newton, F.R.S., who has kindly identified them as probably belonging to *Leuciscus rutilus* (roach) and *Microtus agrestis* respectively. They are both new records. A couple of small incisors in my collection may possibly belong to the last-mentioned. I have also obtained many more mammalian remains, chiefly *Rhinoceros leptorhinus*, *Bos primigenius*, and *Equus caballus*.

Annexed is a complete list of the vertebrata obtained from the Uphall Brickyard, copied, with additions, from Davies' *Catalogue*.⁶ Mr. Hinton (*op. cit.*) also records the albatross (*Diomedea exulans*, Linn.) on the strength of an ulna in the Museum of Practical Geology, but I cannot agree with him in considering it to come from these beds. I have also omitted *Ovis*, which it should be remarked is given with a query.

It is curious that previous writers should have failed to note the occurrence of Palæolithic Implements in the Uphall series. Indeed, until recently, when the above-mentioned author recorded (*op. cit.*) two from the Cauliflower Pit, they were unknown from the Ilford brickearth. I found several *in situ* in the upper part of the gravel, and clearly in association with the extinct mollusca. They consist of flakes, notched on the basal side, so as to produce a saw-like edge, and are not derived, being quite fresh and but little worn. I also obtained many waste flakes—all more or less rolled—from the overlying bed of sand.

5 See MARTIN A. C. HINTON, "The Pleistocene deposits of the Ilford and Wanstead District." *Proc. Geologists' Assoc.*, vol. xvi. (1900), and also ESSEX NATURALIST, vol. xi., pp. 161-165; and A. S. KENNARD and B. B. WOODWARD, "Pleistocene Non-Marine Mollusca of Ilford," *idem*.

6 DAVIES, *Catalogue of Pleistocene Vertebrata* . . . in *Coll. of Sir Antonio Brady*, 1874.

LIST OF VERTEBRATA FROM THE UPHALL
BRICKYARD.

PRIMATES.

**Homo* (indicated by implements)

CANIVORA.

Felis leo, Linn.
Canis lupus, Linn.
C. vulpes, Linn.
Ursus arctos, Linn.
U. horribilis, Ord. (= *ferox*, Rich.)

UNGULATA.

Bison bonasus, Linn., var. *priscus*, Boj.
Bos taurus, Linn., var. *primigenius*, Boj.
Cervus elaphus, Linn.
C. giganteus, Blum.
Capreolus caprea, Gray.
Elephas antiquus, Falc.
E. primigenius, Blum.
Equus caballus, Linn.
Hippopotamus amphibius, Linn.
Rhinoceros antiquitatis, Blum.
R. leptorhinus, Owen.
R. megarhinus, Christol.

RODENTIA.

Microtus amphibius, Linn.
**M. agrestis*, Linn.
**M. gregalis*, Pallas, or *ratticeps*, K. and B.
Castor fiber, Linn.

AVES.

Anas, sp.
Anser, sp.
Cygnus musicus, Bech.

PISCES.

**Luciscus rutilus*, Linn.
Esox lucius, Linn.

7 See R. LYDDEKER, *Cat. Fossil Birds in Brit. Mus. (Nat. Hist.) 1891*.
[Addendum. I find that *Pisidium milium* recorded above is new to the Pleistocene.]

THE POST-PLIOCENE NON-MARINE MOLLUSCA OF ILFORD, ESSEX.

By A. S. KENNARD and B. B. WOODWARD, F.L.S., F.G.S.

IN 1897 the Non-Marine Mollusca from the Pleistocene deposits at Ilford were described by us in the *ESSEX NATURALIST*.¹ Since then Mr. Martin A. C. Hinton has collected extensively in the Cauliflower Pit and his specimens were placed at our service. All the old collections were made in the Uphall Pit, where the shells were abundant, but in the Cauliflower Pit they are scarce, and it is by no means uncommon for a diligent search to yield only two or three specimens. As we noticed in our previous paper, Dr. Corner's examples were also obtained from this latter pit, and from these two collections we are now able to list thirty-four species from this pit, viz. :—

- Vitrea nitida* (Müll.)
- „ *nitidula* (Drap.)
- Vallonia pulchella* (Müll.)
- Hygromia hispida* (Linn.)
- Helicigona arbustorum* (Linn.)
- Helix nemoralis* (Linn.)
- Helicella virgata* (Da Costa)
- „ *asperata* (Mont.)
- Pupa cylindracea* (Da Costa)
- „ *muscorum* (Linn.)
- Vertigo antivertigo* (Drap.)
- Succinea putris* (Linn.)
- „ *elegans* Risso
- Lamnaea pereger* (Müll.)
- „ *palustris* (Müll.)
- „ *truncatula* (Müll.)
- „ *stagnalis* (Linn.)
- „ *glabra* (Müll.)
- Planorbis glaber* (Jeff.)
- „ *carinatus* (Müll.)
- „ *marginatus* (Drap.)
- „ *vortex* (Linn.)
- „ *spirorbis* (Linn.)
- „ *contortus* (Linn.)
- „ *lineatus* (Walk.)

¹ "The Post-Pleistocene Non-Marine Mollusca of Essex." By A. S. Kennard and B. B. Woodward, F.L.S. *ESSEX NATURALIST*, vol. x., pp. 103-5.

- Valvata piscinalis* (Müll.)
 „ *cristata* Müll.
Bythinia tentaculata (Linn.)
Corbicula fluminalis (Müll.)
Anodonta cygnæa (Linn.)
Spharium corneum (Linn.)
Pisidium amnicum (Müll.)
 „ *astartoides* (Sandb.)
 „ *pusillum* (Gmel.)

From the adjacent Uphall Pit forty-six species have been obtained, for in addition to the thirty-nine species recorded by J. P. Johnson and G. White in the last part of the ESSEX NATURALIST (*ante* pp. 157-160), seven other forms are known, viz. :—

- Hygromia hispida* (Linn.)
Helicigona arbustorum (Linn.)
Succinea putris (Linn.)
Planorbis albus (Müll.)
 „ *lineatus* (Walk.)
Bythinia leachii (Shep.)
Unio pictorum (Linn.)

The two lists thus shewing a total of fifty-seven species, being the largest number known from any Pleistocene or Holocene deposit with the exception of Copford and Barnwell. It is indeed worthy of note that in 1890, when the shells from Ilford were first listed by one of us,² only twenty species were known, though ten others were listed on the authority of the various recorders. In 1897, as a result of Dr. Corner's labours, we were able to list thirty-seven forms from known specimens and nine on authority, whilst the last three years' work of Mr. Hinton, Mr. Johnston, and Mr. White has raised the total to fifty-seven known species. There still remain three records to be confirmed, viz. :—

- Pyramidula ruderata* (Stud.)
Vitrea fulva (Müll.)
Planorbis cornuus (Linn.)

Of these there is one form which we strongly desire to be confirmed, *Pyramidula ruderata*. The record is on the authority of Dr. J. Gwyn Jeffreys, who in 1869, during the discussion following a paper by Professor W. Boyd Dawkins "On the

² B. B. WOODWARD.—"On the Pleistocene Non-Marine Mollusca of the London District." *Proc. Geol. Assoc.*, vol. xi., pp. 335-388.

distribution of the British Post-Glacial Mammals,"³ mentioned that this species and *Eulota fruticum* occurred at Ilford. Thinking that it was possible that examples might be in the Jeffreys Collection now (alas!) in Washington, we wrote to Mr. W. H. Dall, who kindly informed us that there are no specimens in that collection. The species is of course now extinct in this country, and is only known fossil from Barnwell, Copford, and Clacton.

By far the most interesting specimen in Mr. Hinton's collection is a single example of *Limnæa glabra*. At the present time it is a widely distributed, though local, form in these islands, but it has hitherto been unknown and unrecorded (unfortunately we have had painful experience that the two terms are not always synonymous) either from the Pleistocene or Holocene. It was, of course, unlikely that so widespread a form could be a recent introduction, and this example enables us to fill up a gap in the geological record.

All the examples we have seen of *Corbicula fluminalis* from the Cauliflower Pit are immature, thus differing from the fine examples found at Uphall.

Vitrea nitidula is an interesting addition to the Ilford fauna. Though an abundant form at the present time, and common in many Holocene beds, it is only known from the Pleistocene of Barnwell, N.E. London, and Copford.

An example of the dwarfed form of *Limnæa palustris*, which occurs in the Pleistocene of Harwich and Crayford, is in Mr. Hinton's collection.

Mr. Johnston and Mr. White have recorded *Sphærium mananum*, Kobelt, from Uphall. This form is in our opinion not entitled to rank as a distinct species, but should be considered a variety of *Sphærium cornucum* (Linn.), which is well known to all conchologists as a polymorphic form, and it is possible to arrange a gradating series from typical *cornucum* to typical *mananum*. We would take this opportunity of thanking Mr. Hinton, Mr. Johnson, and Mr. White, whose continuous work in the field has been the means of greatly extending our knowledge of the Pleistocene Non-Marine Mollusca.

3 *Quart. Jour. Geol. Soc.*, vol. xxv, p. 102.

THE NON-MARINE MOLLUSCA OF THE WALTON CRAG.

By A. S. KENNARD and B. B. WOODWARD, F.L.S., F.G.S., &c

IT is indeed a matter of congratulation that the small patch of Red Crag at Walton has been preserved for the geologist's pick, and has not shared the fate of the adjoining patch at Harwich which is now a thing of the past. At the same time it must be pointed out that the Walton Crag is of much larger extent than is commonly supposed; and Mr. F. W. Harmer has recently obtained a fine series of shells from Little Oakley. Unfortunately our present knowledge of the Pliocene Molluscan Fauna is by no means perfect. The nomenclature is in an almost hopeless condition: collections have been dispersed, several "types" cannot now be traced, and it is greatly to be desired that some competent person will endeavour to place on a more satisfactory basis our knowledge of the fauna of the Crag. As a slight contribution to this end we have ventured to revise the Non-Marine Mollusca, and this was published last year.¹

Thinking, however, that an account of the Non-Marine fauna of the Walton Crag would be of interest to all Essex naturalists, we offer the present note.

Six species in all have been recorded from the Walton Crag:—

1. *Pyramidula rysa*. (S. V. Wood.)

Helix rifa, S. V. Wood; *Crag Moll.*, vol. i., p. 4, pl. i., fig. 1; *Helix rufescens*, Penn., var. ?; J. G. Jeffreys, *Quart. Jour. Geol. Soc.*, vol. xxvii. (1871), p. 493; *Patula (Janulus) rysa*, S. V. Wood; C. L. F. Sandberger, *Land & Süssw. Conch. Vorwelt.*, p. 737.

Only one example of this species has been found at Walton, and this was obtained by Mr. G. S. Gibson from inside the mouth of an example of *Buccinum undatum*, Linn. It is the type of the species, and is now preserved in the Saffron Walden Museum. Only one other example is known, and this was obtained from the coprolite diggers at Waldringfield by Mr. Canham, and is now in the Ipswich Museum. Its nearest allies are apparently *Pyramidula calathus* (Lowe) and *P. bifrons* (Lowe) from Madeira, and it may be referred with these to Lowe's section *Janulus*.

¹ "A Revision of the Pliocene Non-Marine Mollusca of England" By A. S. Kennard and B. B. Woodward, F.L.S. *Proc. Malac. Soc.*, vol. iii., pp. 187-204.

2. *Hygromia incarnata*. (Müll.)

Helix incarnata, R. Bell: "Land Shells in the Red Crag." *Geol. Mag.*, 1884, vol. i., p. 262.

The unique example of this species from the Walton Crag is now in the British Museum (Natural History), and was obtained in 1882 by the late Mr. Groom (*alias* Groom-Napier, the *soi-disant* "Prince of Mantua"). It is by no means a perfect example, but no doubt can be entertained of the determination. On the Continent the only fossil record of this species is from the middle Pleistocene of Cannstadt.

3. *Helicodonta lens*. (Fér.)

Helix lens, Fér.: R. Bell, *op. cit.*, p. 262

A single example of this species is stated by Mr. Bell to have been found at Walton by Mr. Larcher, of King's College, in 1881, and to have been identified by Dr. J. Gwyn Jeffreys and Mr. J. H. Ponsonby, but we have failed to trace the specimen. It is quite unknown in a fossil state on the Continent.

4. *Helix lactea*. (Müll.)

A fine example of this species is in the Robert Bell Collection in the British Museum (National History), and is without doubt the specimen found in 1883 at Walton by Mr. Bell, and recorded by him in the following year.² A fragment of another example is said to have been found at the same time, but this we have failed to trace. This form is unrecorded in a fossil state on the Continent.

5. *Paludestrina stagnalis*. (Bast.)

Paludestrina ulva, Penn.: S. V. Wood, *Crag Moll.*, vol. i., p. 109, and Suppt. i., p. 71, pl. iv., fig. 23, as *Hydrobia ulva*; *Hydrobia ulva*, Penn.: J. Gwyn Jeffreys, *Quart. Jour. Geol. Soc.*, vol. xxvii. (1871), p. 490.

This species is recorded from Walton by Mr. A. Bell. We have not seen any examples, but there is no inherent impossibility in the record, since it occurs in the Lower Pliocene (Congeria) Beds at Mauer, near Vienna, and Bizenz, in Moravia.

6. *Paludestrina ventrosa*. (Mont.)

Paludestrina subumbilicata, Mont.: S. V. Wood, *Crag Moll.*, vol. i., p. 108, pl. xi., fig. 2; *Hydrobia ventrosa*, Mont.: J. Gwyn Jeffreys, *Quart. Jour. Geol. Soc.*, vol. xxvii (1871), p. 490.

² R. BELL.—"Land Shells in the Red Crag," *Geol. Mag.*, 1884, p. 264.

We have only seen one example of this species from Walton, and that is in the collection of one of us. It is one of the most ancient forms of our present fauna, since it occurs not only in the Pliocene of St. Erth, but also in the Lower Miocene of Wiesbaden, the Middle Miocene of Monthelan, near Tours, and in the Lower Pliocene (Congeria Beds) at Mauer, near Vienna.

It is worthy of note that these six species are Southern forms, the two species of *Paludestrina* belonging in all probability to the old Aralo-Caspian fauna. Dr. R. F. Scharff, who has recently called attention to the origin of our fauna,³ states (l.c. p. 8) that the Southern forms must have migrated northward from the Continent long ages ago. Of the four species of land shells, three are unknown in a fossil state on the Continent, and two of them are Mediterranean in their present distribution, while the nearest allies of *Pyramidula rysa* occur in Madeira. Is it too much to suppose that these forms belong to the old Lusitanian fauna as described by Edward Forbes, and that they have reached this country from the south-west over land now sunk beneath the sea? With the same group we would include *Helix pisana* (Müll.), *Helicella virgata* (Da Cost.), and *H. barbara* (Linn.), all of which are unknown in a fossil state on the Continent, though they are found in the Pleistocene of Algiers. These are only tentative views, but we venture to think that they are supported by all the available evidence both of geographical distribution and geological history.

NOTE ON A WEST AFRICAN "STRIKE-A-LIGHT."

By F. W. READER.

THIS object consists of a leather bag, 2 $\frac{1}{4}$ in. by 1 $\frac{3}{4}$ in. square, and a small iron blade which is fastened on the lower edge. The bag contains two ordinary gun flints and some tinder.

It is the workmanship of the West African tribe of the Soosoos, from whom my uncles, Thomas and Edward Reader procured it with other interesting native objects, during the years 1857-66.

³ R. F. SCHARFF.—*The History of the European Fauna*, London. 1899.



Strike-a-light " made and used by the Soosos, West Africa. For explanation see text.

The Soosoos are a tribe whose territory lies on the Mellicourie River to the north of Sierra Leone.

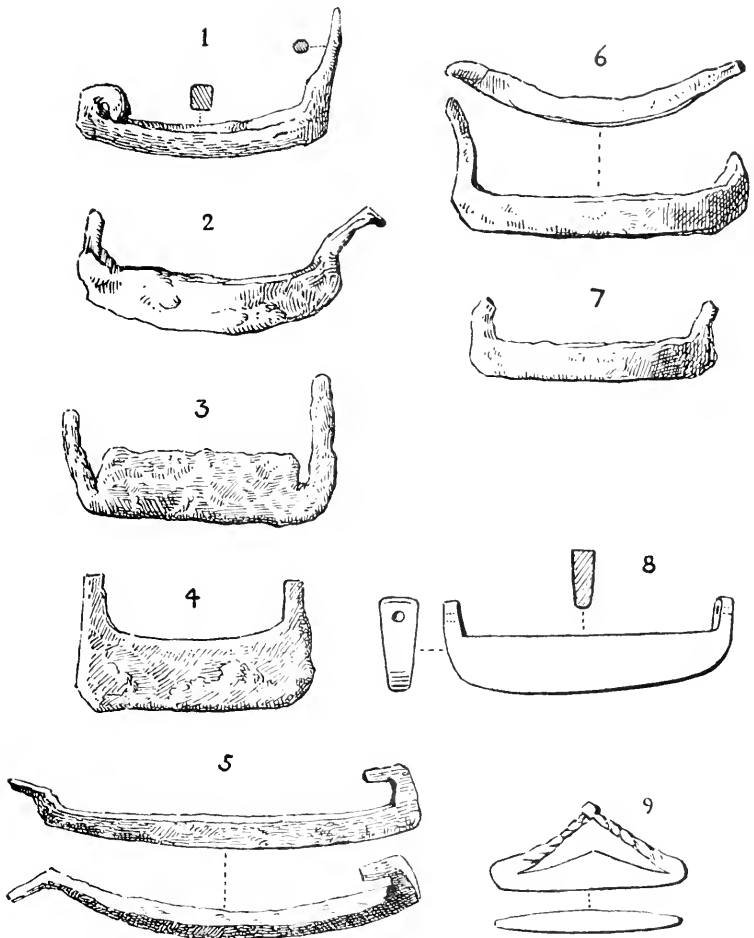
At the time of my uncles' residence in this country, where they acquired plantations and property, the Soosoos were an independent people. Owing to the outbreak of a tribal war, my uncles had to abandon their possessions, and the country was subsequently seized by the French. It now forms part of the hinterland of Sierra Leone, under French dominion, which has been so detrimental to the welfare of the colony.

The Soosoos are Mahomedans, and in accordance with the tradition that Mahomet was a shoemaker, they are enthusiastic workers in leather, making therefrom objects of all descriptions which they ornament elaborately.

Strike-a-lights similarly formed, of a bag with an iron blade attached, have been in use generally over Central Asia, also in Norway and Sweden; specimens of these are to be seen in the Pitt-Rivers collection at Oxford, so that it is possible the idea of this African form may have been introduced to the Soosoos by Arab traders, or even by Europeans. There is no reason to doubt, however, that this particular object is of native manufacture, although possibly the gun flints were imported from Suffolk or Germany. It is possible also that the iron portion may have been imported, although there is not so much reason to suppose this, as iron is so generally worked over the whole of Africa. I merely suggest this because among the collection made by my uncles is a "Charmed Koran" written in Arabic characters and adorned with elaborate coloured diagrams, but all on paper of English manufacture and ruled for cash.

It is on account of the iron portion of this object that I am bringing it before the notice of the Essex Field Club, because it so closely resembles, both in shape and size, a small iron object that has been met with among relics of the Romano-British period in this country.

I have figured six examples (Figs. 1, 2, 3, 5, 6 and 7) from General Pitt-Rivers' *Excavations in Dorset and Wilts*, vols. II. and III., where he describes them as "Objects of unknown use, perhaps Strike-a-lights or for fastening two pieces of wood together." Fig. 4 is an example from a cave near Settle, Yorkshire, and is now preserved in the British Museum.



Figs. 1, 2, 3 and 5 from Rom. Brit. Village, Rotherley, Wilts. (See Pitt-Rivers, *Excavations in Dorset and Wilts*, vol. ii., pl. civ.)

.. 4 from Cave near Settle, Yorks.

.. 6 .. Rom. Brit. Settlement, Woodyates, Dorset (See Pitt-Rivers, *Excavations, &c.*, vol. iii., pl. clxxxiv.)

.. 7 .. Bokerley Dyke, Dorset. (See Pitt-Rivers, *Excavations*, vol. iii., pl. clxxvi.)

.. 8 .. The African (Sooscos) specimen.

.. 9 .. A Chinese Strike-a-light from the Geological Museum.

All the figures are on a scale of two-thirds actual size of the specimens.

The tangs of the iron portion of the African specimen are pierced in order to hinge it to a wire running through the lower edge of the bag. I have not noticed that any of the Romano-British period objects are similarly pierced, but it is easy to conceive many ways in which these might have been fastened to a leather bag or some similar object. The object shewn as Fig. 5 is especially suggestive of such fastening. Moreover these ancient iron objects are so rusted that any piercing would in all probability be filled up.

Most of the Asiatic strike-a-lights appear to have straight blades rivetted to the bag, along its length, with several small rivets, the joint being covered with a band of brass. But I have recently seen in the Cambridge Museum of Archæology a specimen from Kashmir, which was presented by Mr. Edward Lovett.

Its native name is *Chue lun*, or Fire pouch. By the kindness of the Curator, Baron A. von Hügel, I was able to examine it, and was delighted to find, that, although rivetted like most Asiatic specimens that I have seen, the blade has two tangs exactly like the West African specimen, or the Romano-British objects to which I have already referred. It is by means of rivets, which pass from front to back, through the two tangs, that the blade is fastened to the pouch.

Whether the idea of the formation of the African specimen is of native origin, or whether it has been introduced, it is still I think an equally suggestive explanation of the objects belonging to the Romano-British period.¹

I have also figured (Fig. 9) a Strike-a-light from China, which was presented to the Geological Museum, Jermyn Street, by the late Dr. William Lockhart and was pointed out to me by Mr Rudler. Not that this specimen bears directly on the subject, but it is analogous in the form of the blade and serves to show how widely this shape is distributed. A very similar Fire Steel was found in a grave in Gölland, and is figured in *The Viking Age*, Du Chailu, Vol. 2, fig. 1361, p. 478.

¹ Mr. Reader has kindly presented this object to the Club's Museum.—Ed.

MUSEUM NOTES II.

II.—NOTES UPON THE HERBARIUM PRESENTED
TO THE ESSEX FIELD CLUB, BY Mr. J. C.
SHENSTONE.

[As intimated in the last Annual Report of the Council, Mr. Shenstone recently presented his Herbarium to the Club, and he has furnished the following particulars of his collection.]

THIS Herbarium was commenced in April 1874, and the specimens were mainly collected between the years 1874 and 1885.

After the latter year private and public business monopolised my time, and additions to the Herbarium were only made at intervals, during holiday and Field Club excursions, &c.

The Collection contains between 800 and 900 specimens; of these between 600 and 700 are "Essex Specimens," and these were all gathered by myself.

I do not present the collection to the Club as a model of what a Herbarium should be. It was commenced at the time when I was first inspired by an interest in field botany. As usually happens I gained much experience in amassing the specimens, which will be of great service to me in my future botanical work.

It was during the time I was making this collection that I put together the notes embodied in my "Report upon the Flowering plants growing in the neighbourhood of Colchester," (*Essex Naturalist*, Vol. I. pp. 22-35), and the paper "Suggestions for the formation of a County Herbarium," (*E.N.*, vol. iv., pp. 71-78), was founded upon the knowledge gained in gathering together and preparing the Herbarium.

In handing the Herbarium over to the Essex Field Club, I am aware that it requires much overhauling. It was my intention some day to go carefully through all the specimens, to eliminate and replace poor and doubtful specimens, and generally to enlarge and improve the collection, but have been persuaded to hand it over to the Club with all its many faults.

I trust that if not by any means a model collection, it will at any rate form a portion of the Essex Herbarium in the new "Essex County Museum of Natural History," which we hope will very soon be, if the last, not the least of our Essex Institutions.

J. C. SHENSTONE.

Colchester, February, 1899.

III.—NOTES ON A SMALL ESSEX HERBARIUM.

By a series of happy circumstances the collection of dried plants made by the late Miss Doubleday, of Halstead, in this county, recently fell into my hands. An interesting feature of these well-cared for specimens is that many of them are of local origin, and a number of those from Epping are from the Herbarium of, or procured by, the late John Ray, of Epping—not the celebrated Essex naturalist of that name, but a collector of whom little is known, but that he lived a century and a half later¹.

Professor Boulger and I went most carefully through the collection, and picked out all the *Essex* specimens (in number 200, of which 151 are marked as having been collected by "J. Ray," nearly all in the Epping Forest district). I have had pleasure in putting them at Mr. Cole's disposal.

One is tempted to mention a peculiarity about the sheets upon which the plants, including those collected by J. Ray, are mounted. They have originally been most carefully inscribed with the name, locality, and date, down to the day of the month, upon which they were collected. On looking at them, however, it will be noticed that in every case the *year* has been scratched out most neatly, but yet effectually, and even when John Ray's label had been stuck on the paper, this has been treated in the same way. Only two dates (1841 and 1842), on loose labels of the latter kind have not shared the fate that befell the many hundreds of their fellows. I forbear from any comment upon the subject. Until these survivors among the numbers were found, we could only roughly judge of the date of the collection by the water-marks on the paper that indicated 1840.

WILFRED MARK WEBB.

Hammersmith, October, 1899.

¹ We have been unable to obtain any particulars of J. Ray, of Epping, beyond the reference in Gibson's *Flora*, to the following effect:—"J. R...Ray, John, formerly of Epping—List of plants near Epping, mostly included in H. Doubleday's list." We shall be glad to have any further information.—ED.

IV.—PLEISTOCENE NON-MARINE MOLLUSCA FROM
CLACTON-ON-SEA, ESSEX.

By WILFRED MARK WEBB, F.L.S., *Memb. Malac. Soc.*

In the ESSEX NATURALIST some years ago¹ the present writer dealt with a number of Pleistocene shells from a locality presumed to be some miles from Walton-on-Naze² and found by the late John Brown, F.G.S., of Stanway. More recently³ it had to be admitted that this locality was one and the same with Clacton, whence Brown also described shells of like age. The first mentioned specimens being in the possession of the Essex Field Club, a list was given in detail. Since then however, the presentation of further specimens as noted below, and the alteration in the locality, has rendered it advisable that a corrected list should be made out. The present Note further verifies one or two records of the older writers upon whose authority, up to the present time, they solely rested, as none of the species in question could be traced.

The specimens marked "J.W.K." form part of the small collection of Pleistocene remains from Clacton, presented to the Club by the Rev. J. W. Kenworthy, (see ESSEX NAT. vol. x. p. 406) and those marked "W.H.D." formed part of the collection of Mr. W. H. Dalton, F.G.S., recently presented to the Club, [both of which collections will be more fully described in a future "Museum Note."—ED.] The specimens without initials formed part of the original "John Brown Collection."

GASTROPODA.

PULMONATA.

Stylommatophora.

Family—LIMACIDAE.

Vitrea nitida, Müller, J. W. K. This shell is given by Messrs. Kennard and Woodward (E.N. vol. x. in the table in the paper above cited) on the authority of Mr. S. V. Wood.

Pyramidula ruderata, Stud. W.H.D.

Pyramidula rotundata, Müller. J.W.K.

Family—HELICIDAE.

Helicella caperata, Montagu.

Hygromia hispida, L. W.H.D.

¹ E. N. vol. VIII. (1894) pp. 160-162.

² *Essex Herald*, August 1st, 1843.

³ W. M. Webb, "The Non-Marine Mollusca of Essex." ESSEX NAT. vol. x., p. 27; also A. S. Kennard, and B. B. Woodward (with contributions by W. M. Webb), "The Post-Pliocene Non-Marine Mollusca of Essex." E.N. vol. x. p. 9.

Vallonia pulchella, Müller.

Helicigona lapicida, Linné.

Helix nemoralis, Linné.

Helix hortensis, Müller.

Family—PUPIDAE.

Pupa muscorum, Linné.

Vertigo moulinsiana.

Family—STENOGYRIDAE.

Cochlicopa lubrica, Müller.

Azeca tridens, Pulteney.

Family—SUCCINEIDAE.

Succinea putris, Linné. W. H. D.

Basommatophora.

Family—AURICULIDAE.

Carychium minimum, Müller.

Family—LIMNAEIDAE.

Limnaea auricularia, Linné.

Limnaea pereger, Müller.

Limnaea stagnalis, Linné. J. W. K.

Planorbis albus, Müller.

Planorbis marginatus, Drap. W. H. D.

This shell is recorded by Messrs. Kennard and Woodward upon the authority of John Brown, as they were unable to trace specimens.

Family—PHYSIDAE.

Physa fontinalis, Linné. J. W. K.

PROSOBRANCHIATA.

Monotocardia.

Family—HYDROBIIDAE.

Paludestrina ventrosa, Montagu.

Paludestrina marginata, Michaud.

Bythinia tentaculata, Linné.

Vivipara clactonensis, Wood. J. W. K. The most interesting addition is a series of shells of this species. Three specimens only have been previously recorded, two of which, described and figured by Mr. S. V. Wood, have been traced to the Woodwardian Museum at Cambridge by Messrs. Kennard and Woodward. See their paper, already cited (E. N., x, p. 99).

Family—VALVATIDAE.

Valvata piscinalis, Müller.

PELECYPODA.*EULAMELLIBRANCHIATA.**Family*—UNIONIDAE.**Unio littoralis**, Lamark.**Anodonta cygnaea**, Linné. W. H. D.*Family*—CYRENIDAE.

Corbicula fluminalis, Müller. J. W. K. This shell is given by Messrs. Kennard and Woodward on the authority of the late Searles V. Wood.

Sphaerium corneum, Linné. J. W. K.**Pisidium amnicum**, Müller.**Pisidium astartoides**, Sandberger.

Much additional information with regard to some of the above named species will be found in my former Note, and in the other papers alluded to above.

V.—PLEISTOCENE SHELLS FROM COPFORD, ESSEX.

By WILFRED MARK WEBB, F.L.S.

No list exists of the shells from this historic locality which are in the possession of the Club, and the writer has thought it of interest to compile the following, which indicates from what collections the specimens had been derived. The most recent additions are due to the kindness of Mr. Dalton, F.G.S., who has presented the specimens obtained by the late John Brown, which formed part of his own collection. These are marked with his initials (W. H. D.), in addition to the letters J. B., which indicate the original collection of the late John Brown.

GASTROPODA.*PULMONATA.***Stylommatophora.***Family*—LIMACIDAE.**Vitrea crystallina**, Müller. J. B. Coll. (W.H.D.).**Vitrea cellaria**, Müller. J. B. Coll.**Vitrea nitidula**, Draparnaud. W. Whitaker Coll.**Vitrea radiatula**, Alder. J. B. Coll.**Vitrea nitida**, Müller. J. B. Coll.**Vitrea fulva**, Müller. W. Whitaker Coll.*Family*—ENDODONTIDAE.**Pyramidula rotundata**, Müller. J. B. Coll.

Family—HELICIDAE.

- Helicella caperata*, Montagu. J. B. Coll.
Hygromia rufescens, Pennant. J. B. Coll.
Acanthinula aculeata, Müller. J. B. Coll. (W. H. D.)
Acanthinula lamellata, Jeffreys. J. B. Coll. (W. H. D.)
Vallonia pulchella, Müller. J. B. Coll. (W. H. D.)
Helicigona lapicida, Linné. J. B. Coll.
Helicigona arbustorum, Linné. J. B. Coll.
Helix nemoralis, Linné. J. B. Coll.
Helix hortensis, Müller. J. B. Coll.

Family—PUPIDAE.

- Pupa cylindracea*, Da Costa. J. B. Coll. (W. H. D.)
Pupa muscorum, Linné. J. B. Coll. (W. H. D.)
Vertigo antivertigo, Draparnaud. J. B. Coll. (W. H. D.)
 One specimen, labelled *pygmaea*. (A series from W. Whitaker's Collection is also in the possession of the Club.)
Vertigo pygmaea, Draparnaud. J. B. Coll. (W. H. D.)
Vertigo moulinsiana, Dupuy. J. B. Coll. (W. H. D.)
 Two specimens labelled *pygmaea*.
Vertigo pusilla, Müller. J. B. Coll. (W. H. D.)
Vertigo angustior, Jeffreys. J. B. Coll. (W. H. D.)
 Four specimens labelled *pusilla*.

- Clausilia laminata*, Montagu. W. Whitaker Coll.
Clausilia bidentata, Ström. J. B. Coll. (W. H. D.)

Family—STENOGRYRIDAE.

- Cochlicopa lubrica*, Müller. J. B. Coll.
Azeca tridens, Pulteney. J. B. Coll.

Family—SUCCINEIDAE.

- Succinea putris*, Linné. J. B. Coll.
Succinea elegans, Risso. J. B. Coll.

Basommatophora.*Family*—AURICULIDAE.

- Carychium minimum*, Müller. J. B. Coll. (W. H. D.)

Family—LIMNAEIDAE.

- Limnaea truncatula*, Müller. J. B. Coll. (W. H. D.)
Planorbis spirorbis, Linné. J. B. Coll.

Family—PHYSIDAE.

- Physa hypnorum*, Linné. W. Whitaker Coll.

PROSOBRANCHIATA.*Family*—ACICULIDAE.

- Acicula lineata*, Draparnaud. J. B. (W. H. D.)

PELECYPODA.

EULAMMELLIBRANCHIATA.

Family—CYRENIDAE.

Pisidium pusillum, Gmelin. J. B. Coll. (W.H.D.)

Specimens from John Brown's collection illustrating many of the species which Mr. Dalton presented, were already in the Club's series, and sets of many picked out from material given by Mr. W. Whitaker, F.R.S., were arranged by the writer when first he worked out the Club's Copford shells.

HISTORY OF ESSEX BOTANY.

By Prof. G. S. BOULGER, F.L.S., F.G.S., *Vice-President*.PART I. (*continued from p. 184*).

THE BOTANISTS OF THE SIXTEENTH AND SEVENTEENTH CENTURIES.

William How, or Howe, was born in London in 1620, entered Merchant Taylor's School in 1632, and St. John's College, Oxford, in 1637, graduating as B.A. in 1641, and proceeding M.A. in 1644. He began the study of medicine, but took up arms in the King's behalf, and was given the command of a troop of horse. On the downfall of the royalist cause he began to practice medicine in London, first in St. Lawrence Lane, and afterwards in Milk Street, Cheapside; but, though commonly called Dr. How, he does not seem to have taken a doctor's degree. He died at Milk Street, August 30th, 1656, and was buried in the churchyard of St. Margaret's, Westminster, leaving behind him, as Antony à Wood says, a "choice library of books of his faculty, and the character of a noted herbalist." In 1650 he published anonymously *Phytologia Britannica natales exhibens indigenarum Stirpium sponte emergentium*, in 134 pp., 8vo., a work first attributed to him by Merret.³⁹ This little work is noteworthy as the first exclusively British flora; but, though it enumerates 1220 plants, mostly spermatophytes, it is far from critically accurate, Ray enumerating more than thirty species recorded in it which had no claim to be considered indigenous. The Essex records in it are seven in number, viz. :—

39 "Pinax," 1666; Epistola ad Lectorem A2.

p. 28. "*Clematis Bætica*, By Waltham Abby. *The Spanish Travellers Joy*." [Probably merely an escape.]

p. 31. "*Convolvulus minimus spicæ folius*, Ger.," from Great Dunmow, as previously recorded by Gerard.

p. 32. "*Crithmum spinosum*, Matth. *pastinaca marina quibusd. Thorny Sampfire*, by Lee in Essex." [On this record of the now extinct *Echinophora spinosa* L., Merret remarks,⁴⁰ "ut Ph. 'tis not found there, but below Feversham."]

p. 73. "*Matricaria flore bullato aureo*," as previously noticed by Coys.

p. 94. "*Pisa marina Anglica*. . . In *Essexia* e regione *Kantii* pratensibus editioribus hoc *Pisi* syl. genus multo majus reperi." [Professedly transcribed from Lobel's manuscript marginalia to his own "*Historia Plantarum Teutonica*," i.e., probably the *Kruidtboeck* of 1581.]

p. 95. "*Plantago aquatica minor stellata, Damasonium stellatum, Lugd.*" [*Damasonium Alisma* Miller, as in *Ger. em.* 418.]

And p. 129. "*Viola Lunaria, Viola latifolia, Dod. Clus. Ger. Bolbonac vulgatissima White Satten*: About *Horne-Church* in *Essex*." [*Lunaria biennis* L., as in Gerard, p. 377.]

Enough has already been said as to How's publication of Lobel's *Illustrationes* in order to attack Parkinson, whilst the above shows that he is not to be credited with any new Essex records.⁴¹

In chronological succession the next work containing Essex records is Robert Turner's *Botanologia*, published in 1664. But little is known about this writer. He was born at Holshott and educated at the university of Cambridge,⁴² and between 1654 and 1664 published nine works, mostly astrological. Portraits of him are prefixed to some of his works, and he describes himself as "*Botanologiæ Studiosus*." The title of his herbal is *Botanologia. The Brittish Physiciau; or, The Nature and Vertues of English Plants; exactly describing such as grow naturally in the land, with their severall names, Greek, Latin, or English; natures, places where they flourish, and are most proper to be gathered; their degrees of temperature, applications, and vertues, physical and astrological uses treated of.*

⁴⁰ "Pinax," p. 31.

⁴¹ For some further particulars as to How see Pulteney, *Sketches*, i., pp. 169-174 and *Dict. Nat. Biog.*, xxviii., 102.

⁴² Was he the Robert Turner who graduated from St. Catherine's College as B.A. in 1661? See Luard, *Graduati Cantabrigienses*.

Turner apparently records only five plants from Essex, viz. :—

Eryngium maritimum L.

Althæa officinalis L.

Linum catharticum L.

Crocus sativus L.

Cochlearia anglica L.

His account of the saffron (p. 284) is worth quoting :—

“ It is plentifully manured in Fields in *Essex* and *Cambridgeshire* : *Saffron Walden* takes her name from its growing there ; it begins to flower in *September*, and presently after the leaves shoot forth and abide green all the Winter, dying again in *April*, when it puts forth another Crop of Flowers, which must be gathered as soon as it is blown, or else it is lost ; so that Jack Presbyter for covetousness of the profit can reach his Sabbatarian conscience to gather it on Sunday ; and so he can to do any thing else that redounds to his profit, though it destroy his Brother.”

A second edition of the *Botanologia* appeared in 1687, when, however, it had been superseded by a work of a far higher order.⁴³

Two years after the first edition, appeared the *Pinax rerum naturalium Britannicarum* of Dr. Christopher Merrett. Pulteney devotes a chapter⁴⁴ to Merrett, or Merret as he spells it, and there was not much for the present writer to add when preparing the notice for the *Dictionary of National Biography*.⁴⁵ Merrett, whose father and son bore names identical with his own, was born at Winchcombe, Gloucestershire, February 16, 1614. In 1631 he entered Gloucester Hall (now Worcester College), Oxford, two years later migrated to Oriel, graduated B.A. in 1635, M.B. in 1636, and M.D. in 1643. He then came to practice in London, becoming F.R.C.P. in 1651, and Gulstonian lecturer in 1654. In the same year he was appointed, on the nomination of his friend William Harvey, the discoverer of the circulation of the blood, as “ *Musei Harviani custos*,” a post he retained until 1666, and took a lease of the house belonging to the Royal College of Physicians at Amen Corner for twenty pounds. His rent was remitted in “ recompence for his pains for looking after the new library,” and Harvey in his deed of gift in 1656 assigned £20 per annum for the librarian. In 1657, and in seven years subsequently to that date, Merrett acted as Censor to the College, and he was one of the first fellows of the Royal

43 For all that is known of Robert Turner see *Dict. Nat. Biog.*, vol. lvii., p. 354.

44 *Op. cit.*, vol. i., chap. 22. pp. 290-7.

45 Vol. 37, pp. 288-9.

Society on its incorporation (1663). He published various works, including *A Collection of Acts of Parliament . . . concerning . . . Grants to the College of Physicians* (1660), *The Art of Glass: how to colour Glass, Enamels, Lakes, &c.*, translated from Antonio Neri's *De Arte Vitriariâ* (1662),⁴⁶ and an edition of the original Latin (1668), and several papers in the early volumes of the *Philosophical Transactions*, which are enumerated by Pulteney (*loc. cit.*) and include some dealing with experiments on vegetation, the Lincolnshire fens, and the Cornish mines. The *Pinax* was undertaken, he says, at the request of a bookseller, to replace How's *Phytologia*, when that work had gone out of print; and it was to have been written in conjunction with a Dr. Dale, who, however, died soon after the work was planned. This was not the Samuel Dale to whom we shall have to refer at length later on. Merrett also states in his *Epistola ad Lectorem* that he had purchased figures, engraved at the order of Thomas Johnson, to illustrate the work. These figures were, however, never published; but remain (though Pulteney writes "nor do I find any further notices of them") in the British Museum library.⁴⁷

Pulteney writes⁴⁸ apologetically of the undoubted shortcomings of Merrett's *Pinax*:—

"Dr. Merret, though unquestionably a man of learning, taste, and considerable information in natural history, seems to have engaged in it too late in life, to admit of his making that proficiency, which the design required. Add to this, that being fixed in *London*, and closely engaged in the practice of his profession, he was rendered incapable of investigating plants, in the distant parts of the kingdom. He however engaged *Thomas Willisel* to travel for him; and he tells us that *Willisel* was employed by him for five successive summers. His son, *Christopher Merret*, also made excursions for the same purpose; and Mr. *Yauldon Goodyer* furnished him with manuscripts of his grandfather. By these assistances Dr. *Merret* procured a large number of *English* plants, and a knowledge of the *Loci Natales*. Nevertheless, he was not possessed of that critical and intimate acquaintance with the subject, which might have enabled him to distinguish, with sufficient accuracy, the species from varieties. . . . At the end of the Catalogue is subjoined a rude disposition of vegetables into classes. . . . This he hoped to have improved, against the time of a second

⁴⁶ This translation was privately re-printed in folio in 1826 at Sir T. Phillip's press at Middle Hill.

⁴⁷ The volume is catalogued '441. i. 6. Plants. A Collection of figures with MS. notes by C. Merrett. London, 1670, fol.' It contains 97 double pages, on which are 762 figures, evidently merely proofs, the "notes" being only Merrett's MS. names. There is no title-page; but the first page is inscribed as follows:—"This book did belong to Dr. Merret author of the *Pinax*, &c. The wryting in it is his hand. Mr. Bateman the bookseller who sold it to me (19 Sept. 1695) said that these cuts or figures were made by Dr. Johnson's command (qui emaculavit Gerardum) in order to serve a new herbal which he designed to set forth. Mr. Bateman had this Dr. Merrett's executors who sold him the Doctor's (Merrett's I mean) Library.—ROBERT GRAY, M.D."

⁴⁸ *Op. cit.* pp. 292-4.

edition, which, probably, Mr. *Ray's* publications superseded. Dr. *Merrett* has, in this *Pinax*, introduced many plants as new, which, on subsequent examination, proved to be only varieties; a number of exotics, evidently the accidental offspring of gardens, and many that could never be met with by succeeding botanists, in the places specified by him. He enumerates upwards of 1,400 species of *English* plants; whilst the accurate Mr. *Ray*, only three years afterwards, confines the number to 1,050."

Merrett's more accurate contemporaries were less tolerant than Pulteney. Thus *Ray* writes to *Lister*, from Middleton, under date June 18, 1667:—

"My spare hours I bestowed . . . the most part of the winter . . . in gathering up into a Catalogue all such plants as I had at any time found growing wild in England, not in order to the present publishing of them but for my own use, possibly one day they may see light. at present the world is glutted with Dr. Merrett's bungling *Pinax*. I resolve never to put out anything which is not as perfect as is possible for me to make it."

This letter is only given in part in *Derham's Philosophical Letters* (1718), p. 18, and in the *Ray Society's Correspondence of John Ray* (1848), p. 13; but this passage is inserted by *Derham* in his *Life of Ray* (1760), and appears on pp. 17-18 of the *Ray Society's Memorials* (1846).

It would be interesting to know more of Thomas Willisel, Cromwellian soldier, and collector for Merrett, *Ray*, and the Royal Society, than the little the present writer was able to put together for the *Dictionary of National Biography*⁴⁹; but it does not appear that he collected in Essex.

Merrett was one of the earliest fellows of the Royal Society on its incorporation: he retired into the country during the plague; and the existence of copies of his *Pinax*, dated 1666, and others dated 1667 strongly suggests, as was pointed out by the Rev. W. W. Newbould,⁵⁰ that the stock was destroyed in the Great Fire. Merrett died "at his house, near the chapel in Hatton Garden, in Holborne, near London, Aug. 19, 1695; and was buried twelve feet deep in the church of St. Andrew's, Holborne."⁵¹ His herbarium is in that of Sloane and his own copy of his book is in the British Museum library [Press mark 976. b. 3].

There are fourteen Essex records in the "*Pinax*," viz.:—

⁴⁹ Vol. 62.

⁵⁰ *Trimen & Dyer, Flora of Middlesex*, p. 372.

⁵¹ *Anthony à Wood, Athenæ Oxonienses*, ed. Bliss, iv., 432.

<i>Castanea sativa</i> Mill.	<i>Lathyrus hirsutus</i> L.
<i>Convolvulus arvensis</i> L.	<i>L. maritimus</i> Bigel.
<i>Coriandrum sativum</i> L.	<i>Polygonum aviculare</i> L.
<i>Echinophora spinosa</i> L.	var. <i>littorale</i> (Link)?
<i>Crocus sativus</i> L.	<i>Rubus thyrsoidens</i> Bell.
<i>Spartina stricta</i> Roth.	<i>Trifolium scabrum</i> L.
<i>Galeopsis angustifolia</i> Ehrh.?	And <i>Tragopogon minus</i> Mill.
(twice)	

Of these, *Castanea* is erased in Merrett's own copy, the record of *Convolvulus* is merely that of "*C. minimus spica folius*" from Parkinson (*vide supra*, pp. 173-1), and that of *Coriandrum* is only as a cultivated plant. *Crithmum spinosum* or *Echinophora*, is, as has been already mentioned, only quoted from How's *Phytologia* to be contradicted, and *Crocus* is also enumerated as cultivated. On p. 69 is the entry *Ladanum segetum* Plin. G. 699. 7. *Sideritis arvensis* flora rubro Cam. P. 58. . . and at Purfleet in Essex;" and, on p. 113, "*Sideritis arvensis rubra*. P. 587. 13. *Tetralit angustifolia* Hist. Lugd., . . and at Purbeck in Essex." These two entries are undoubtedly both taken from that in Johnson's *Ger. em.* p. 699 quoted above (p. 175 *supra*), and Parkinson's *Theatrum* p. 587, and refer to one species, *Galeopsis angustifolia* Ehrh., in all probability, and to Purfleet. This reduces Merrett's additions to our county flora to seven, most of which present points of special interest.

p. 58. "*Gramen Sparticum capite bifido vel gemino*. . . . At Crisey ferry in Essex." [*Spartina stricta* Roth.]

Merrett's discovery of this salt-marsh species, which we now know from the shores of Western Europe from Portugal to Holland, and in England from Devon to Lincolnshire, attracted the attention of the more accurate Adam Buddle, who became vicar of Great Fambridge in 1705. In his manuscript *Flora*, written in 1708, he says, "I found it in Aug. 1703 abundantly in the marshes upon the River Wallfleet, near Fambridge Ferry in Dengey hundred in Essex." A description of it, from Petiver's hortus siccus, appeared in the Appendix to the third volume of Ray's *Historia Plantarum* (p. 248) in 1704, possibly from the pen of Buddle, and it appears as No. 35 in Petiver's *Graminum Concordia* (much of which is copied from Buddle's manuscript), in 1716, under the name *Spartum Essexianum, spica gemina clausa*. This name is employed in Dillenius's edition of the *Synopsis* (1724), where the description runs: "sparteum serotinum, spica totali in

duas tresve spicas alternas quasi fissili, unam præcipue partem spectante D. Buddle." The plant, being abundant enough, has naturally been observed in the district by subsequent botanists such as Edward Forster, the Rev. Thomas Benson, many years vicar of Fambridge, Dr. Varenne, between 1867 and 1873, and the present writer in 1890.

p. 70. "*Lathyrus pcrennis siliqua hirsuta*. At Hadly Castle two miles from Lee in Essex." [*Lathyrus hirsutus* L.]

This is the first record of one of the most exclusively South Essex species. Ray recorded it, having looked up its continental synonymy, in the first edition of his *Catalogus Plantarum Angliæ* (1670), p. 190, as from Hockley, Raleigh, and Rochford Hundred, and Dale reported it from Dengey Hundred; nor is there any reason to doubt that it was once more widely spread, though not recorded from Nazing until 1836. In spite of cultivation it holds its own in several localities, including the earliest recorded, where Gibson collected it in 1834, Babington in 1835, Syme in 1860, and Messrs. E. A. Fitch and W. Cole in 1889, and Latchingdon, where it has been known as abundant since 1850. There is an excellent coloured plate of this species in Gibson's *Flora*.

p. 94. "*Pisum aliud maritimum Britannicum*, P. 1060. G. 1250. On Essex shores." [*Lathyrus maritimus* Bigel.]

Though nowhere else recorded from Essex, this species may have occurred in the county, since Ray mentions it from both Hastings (Sussex) and Suffolk, and it is credited to Kent from Camden's *Britannia* (1586) to Watson's *Typographical Botany* (1873). Its chief interest, however, centres round its occurrence, as Ray expresses it, "On the long baich of Stones running from Aldburgh towards Orford in Suffolk," where it saved the inhabitants from famine in 1555. This was first mentioned in the letters of Dr. John Caius (1510-1573) to Conrad Gesner, and published by the latter in *De Aquatilibus*, lib. 4, p. 256, and was afterwards narrated by Stow in his *Chronicle* (1580).

p. 96. "*Polygonum marinum*. Near Lewis in Essex."

Whatever the locality may mean, this record is at least equally obscure botanically. It is not likely to refer to *Polygonum maritimum* L., which belongs to the south-west of England; but may be *P. Raii* Bab., which has been doubtfully recorded for

Canvey Island.⁵² More probably it was *P. aviculare* var. *littorale* (Link), which is recorded from Essex by Syme.⁵³

p. 106. "*Rubus morus*. The Mulberry Bramble, so call'd by the Countrey people at Sutton in Essex."

This has been shown,⁵⁴ thanks to a specimen in Samuel Dale's herbarium, to be *Rubus thyrsoideus* Bell.

p. 119. "*Tragopogon minus angustifolium* G. 735. 3 2 mile on this side Epping in the forest." [*Tragopogon pratense* L. var. *minus* (Mill.)]

p. 120. "*Trifolium Lafatum* C.B. *capite albidiori minusque aspero* . . . two miles beyond Tilbury towards Lee in Essex."

This species is placed in the *Indiculus plantarum dubiarum* of the Dillenian *Synopsis* (1724), and I am not more certain as to the correctness of referring it to *Trifolium scabrum* L. than was Gibson (*Flora of Essex*, p. 76); but, considering that *T. scabrum* occurs not far off, it is difficult to suggest any other identification.

(To be continued.)

EDUCATION IN RURAL SCHOOLS.

By Prof. R. MELDOLA, F.R.S., &c.

It is a matter of congratulation that the new Board of Education has at the outset of its existence officially recognized the requirements of country children in the way of education. All who have interested themselves in the great questions connected with modern education have long since realized that the curricula of town schools were not at all adequate for the training in rural districts of children, whose future career might be more or less dependent on agricultural pursuits. It will be remembered that last summer a forcible speech on this subject was delivered by Sir John Gorst at the Countess of Warwick's School at Bigods, near Dunmow. I may add that the necessity for differentiating between town and country education has long been recognized by Lady Warwick as well as by the writer of this note. The school at Bigods, due to the munificence and educational foresight of my distinguished

52 Gibson's *Flora of Essex*.

53 *English Botany*, ed. iii., vol. viii., p. 68.

54 H. N. Ridley, in *Journal of Botany*, 1885, p. 370.

colleague, is the outcome of this recognition. In the meantime another organization has been called into existence. Last year Sir Wm. Hart-Dyke, M.P., and Mr. Henry Hobhouse, M.P., brought together a most powerful "Agricultural Education Committee," composed of every Member of Parliament interested in the subject, together with a large number of educational, agricultural, and administrative experts.¹ After many meetings and much discussion a number of resolutions were framed and brought under the notice of the Duke of Devonshire and Sir John Gorst by a most representative deputation which was received at the Education Department a few months ago by the Lord President and the Vice-President of the Council. These resolutions covered the whole ground of rural education, both in its elementary and advanced stages, and were supported by Sir Wm. Hart-Dyke, Sir Henry Roscoe, Principal Reichel, Mr. Macan, the present writer, and others.

That the sympathy of the Education Department would be secured from the first might have been inferred from Sir John Gorst's speech at Dunmow last year. It is with particular satisfaction, therefore, that all educationalists and all lovers of Nature will read the following Circular addressed to the Managers and Teachers of Rural Elementary Schools by the Board:—

"BOARD OF EDUCATION, WHITEHALL, LONDON, S.W.,
"April, 1900.

"Sir,—The Board of Education are anxious to call the attention of Managers and Teachers of Elementary Schools, situated in the agricultural districts of England and Wales, to the importance of making the education in the village school more consonant with the environment of the scholars than is now usually the case, and especially of encouraging the children to gain an intelligent knowledge of the common things that surround them in the country. From experience gained in various districts, it is found that by a suitable arrangement and handling of the school curriculum this object can often be attained without necessarily adding any new subjects to the timetable, or demanding any undue burden or work from teachers or scholars.

"The Board would deprecate the idea of giving in Rural Elementary Schools any professional training in practical agriculture, but they think that teachers should lose no opportunity of giving their scholars an intelligent knowledge of the surroundings of ordinary rural life, and of showing them how to observe the processes of Nature for themselves. One of the main objects of the teacher should be to develop in every boy and girl that habit of inquiry and research so natural to children; they should be encouraged to ask their own questions about the simple phenomena of Nature which they see

¹ The writer is a member of the executive body of this Committee, the formation of which is almost entirely due to the zeal of Mr. Hobhouse.

around them, and themselves to search for flowers, plants, insects, and other objects, to illustrate the lessons which they have learnt with their teacher.

"The Board consider it, moreover, highly desirable that the natural activities of children should be turned to useful account—that their eyes, for example, should be trained to recognise plants and insects that are useful or injurious (as the case may be) to the agriculturist, that their hands should be trained to some of the practical dexterities of rural life, and not merely to the use of pen and pencil, and that they should be taught, when circumstances permit, how to handle the simpler tools that are used in the garden or on the farm, before their school life is over.

"The Board are of opinion that one valuable means of evoking interest in country life is to select for the object lessons of the lower Standards subjects that have a connection with the daily surroundings of the children, and that these lessons should lay the foundation of a somewhat more comprehensive teaching of a similar kind in the upper Standards.² But these object lessons must not be, as is too often the case, mere representations of descriptions from text-books, nor a mechanical interchange of set questions and answers between teacher and class. To be of any real use in stimulating the intelligence, the object lessons should be the practising ground for observation and inference, and they should be constantly illustrated by simple experiments and practical work in which the children can take part, and which they can repeat for themselves at home with their own hands. Specimens of such Courses can be obtained on application to the Board of Education. These may be varied indefinitely to suit the needs of particular districts. They are meant to be typical and suggestive, and teachers, it is hoped, will frame others at their discretion. Further, these lessons are enhanced in value if they are connected with other subjects of study. The object lesson, for example, and the drawing lesson, may often be associated together, and the children should be taught to draw actual objects of graduated difficulty, and not merely to work from copies. In this way they will gain a much more real knowledge of common implements, fruits, leaves, and insects than if these had been merely described by the teacher or read about in a lesson book. Composition exercises may also be given—after the practical experiments and observations have been made for the purpose of training the children to express in words both what they have seen and the inferences which they draw from what they have seen; and the children should be frequently required and helped to describe in their exercise books sights of familiar occurrence in the woods and in the fields. Problems in arithmetic connected with rural life may also be frequently set with advantage.

"The Board of Education also attach considerable importance to work being done by the elder scholars outside the school walls, whether such work takes the form of elementary mensuration, of making sketch-plans of the playground and the district surrounding the school, of drawing common objects of paying visits of observation to woods, lanes, ponds, farms, and other suitable places under the guidance of the teacher, or of the cultivation of a school garden.

"The teacher should, as occasion offers, take the children out of doors for school walks at the various seasons of the year, and give simple lessons on

² The important points to be observed in all object teaching were set out in the Official Circular (No. 369) issued on this subject on June 25th, 1895, copies of which may be obtained from the Board of Education.

the spot about animals in the fields and farmyards, about ploughing and sowing, about fruit trees and forest trees, about birds, insects, and flowers, and other objects of interest. The lessons thus learnt out of doors can be afterwards carried forward in the school room by reading, composition, pictures, and drawing.

“In this way, and in various other ways that teachers will discover for themselves, children who are brought up in village schools will learn to understand what they see about them, and to take an intelligent interest in the various processes of Nature. This sort of teaching will, it is hoped, directly tend to foster in the children a genuine love for the country and for country pursuits.

“It is confidently expected that the child’s intelligence will be so quickened by the kind of training that is here suggested that he will be able to master, with far greater ease than before, the ordinary subjects of the school curriculum.

“The Board would further urge upon any teachers now in rural schools who happen themselves to be of urban up-bringing or to have been trained in urban centres, to seize every opportunity of gaining a closer insight into the special conditions and problems of rural life, and they trust that those whose previous education has not enabled them to obtain full knowledge of the main principles and phenomena of rural life and activities, will be able to attend such holiday courses and classes as may be placed within their reach for this purpose by County Councils or other Local Committees; since it is only when the teacher is genuinely interested in, and well informed about, the occupations of country life that any such results can be looked for in children as have been referred to as the proper object of rural schools in the present circular.

“I have the honour to be, Sir, your obedient servant,

“G. W. KEKEWICH.”

The curricula for Schools of Science in rural districts have also been revised and brought into harmony with local needs to an extent that was quite impossible under the old regulations. By the time this note appears the new Directory will no doubt be before the public.

It is needless to point out to the Members of the Essex Field Club that the whole spirit of this new departure in our educational programme is in absolute accord with the aim and objects of all Natural History Societies, and should in the long run result in a general increase in the intelligent appreciation of the work of such societies.

CHRISTOPHER SAXTON, DRAUGHTSMAN OF THE OLDEST KNOWN MAP OF ESSEX.

By JOHN AVERY, C.A.

[Read December 17th, 1898.]

At the meeting above referred to, Mr. Avery exhibited a very fine copy of a map of Essex, supposed to be the oldest in existence, dated 1576, and made some remarks on Saxton's life and works, which are embodied in the following notes. The next oldest map is probably that left in M.S. by John Norden, 1594, a *facsimile* copy of which was, by the kindness of Mr. Winstone, presented to our readers with Volume I. of the *ESSEX NATURALIST*. This was not, however, actually *published* until 1840. In the same volume Mr. Winstone gave a reproduction of Robert Morden's map, 1695, being one of the series of maps of the Counties of England given in Gibson's edition of Camden's *Britannia*.—ED.]

CHRISTOPHER SAXTON, topographical draughtsman, to whom we are indebted for the first maps of the counties in England and Wales, was born of an old Yorkshire family at Tingley in Mosley Hundred, near Leeds. He is said to have been partly educated at Cambridge, but at what College is not known. He was attached to the household of Thomas Seckford, Esq., Master of the Requests to Queen Elizabeth and Master of the Court of Wards. At Seckford's instigation and expense and with the authority of Queen Elizabeth, Saxton undertook to survey and draw careful maps of every county in England and Wales, and for this purpose spent nine years in travelling over the whole Kingdom. This was the first survey of the English Counties, and all subsequent maps of the period were based upon them. Seckford obtained for Saxton from the Privy Council special facilities "to be assisted in all places where he shall come for the view of such places to describe certain counties in cartes, being thereunto appointed by her Majestie's bill under her signet." Travelling in Wales being a matter of difficulty, special injunctions were sent in 1576 "to all Justices of Peace, Mayors, and others in Wales to see him conducted unto any towne, castle, high place, or hill, to view that countrey, and that he may be accompanied with two or three honest men, such as do best know the country for the better accomplishment of that service; and that at his departure from any towne or place that he hath taken the view of, the said towne do set forth a horseman that can speke both Welshe and Englishe, to safe conduct him to the next Market Towne."

The maps drawn by Saxton were engraved by "Augustine Ryther," "Remigius Hogenberg," "Leonard Terwoort," of Antwerp, "Nicholas Reynolds," of London, "Cornelius Hogius" and "Francis Scarterius." There is no evidence on the maps that Saxton engraved any of them himself, but, according to one account, he engraved those of the Welsh counties and Herefordshire with his own hand. Saxton obtained a licence to sell these maps for a term of ten years, under a grant made at Goramby, July 22nd, 1577.

He also published a map of Yorkshire with views of York and Hull. He is highly commended for his work by Camden and Thoresby the latter of whom calls his map of Yorkshire the best that ever was made of that county. This map was three feet wide. The maps are now scarce, and complete copies of the atlas are very rare, and as early as 1839 one was offered for £12 12s. The copy at the Sunderland Library sale, wanting the title, list of maps and portrait, realised £25. No doubt the scarcity of the complete atlas is accounted for by the fact that the maps appear to have been published separately between 1574 and 1579, showing that the labour of six years had been spent upon them. In this latter year the title and index were added, and then issued complete under the title of *Atlas Anglicanus in suis Comitatum Descript apud Christ : Saxon*. London 1574-9."

A copy with the maps coloured is in the British Museum and contains an engraved list of the maps commencing "Comitatum singolorum," index, &c., and concluding "Anno Domini 1579"; then follows a portrait of Queen Elizabeth on her throne with eight Latin verses dated 1579, after which are 35 maps including that of England.

Another copy consisting of the same 35 maps with a different index affixed commencing "Indicem huic operi tripartitum," &c., and a folding plate of Arms and "Catalogus Vrbum," &c., is also in the British Museum.

Lowndes records in 1864 that a copy of the Saxton maps printed on vellum and not quite perfect was in the possession of David Laing, Esq., of Edinburgh. I believe the Laing collection was disposed of by public auction about 1880.

In 1884 a copy of the atlas uncoloured on vellum, but wanting the Maps of Yorkshire and Hampshire was priced in a booksellers catalogue at £80, and is probably the same copy as that

reported upon by Lowndes. It was described in the catalogue as having formerly belonged to Queen Elizabeth.

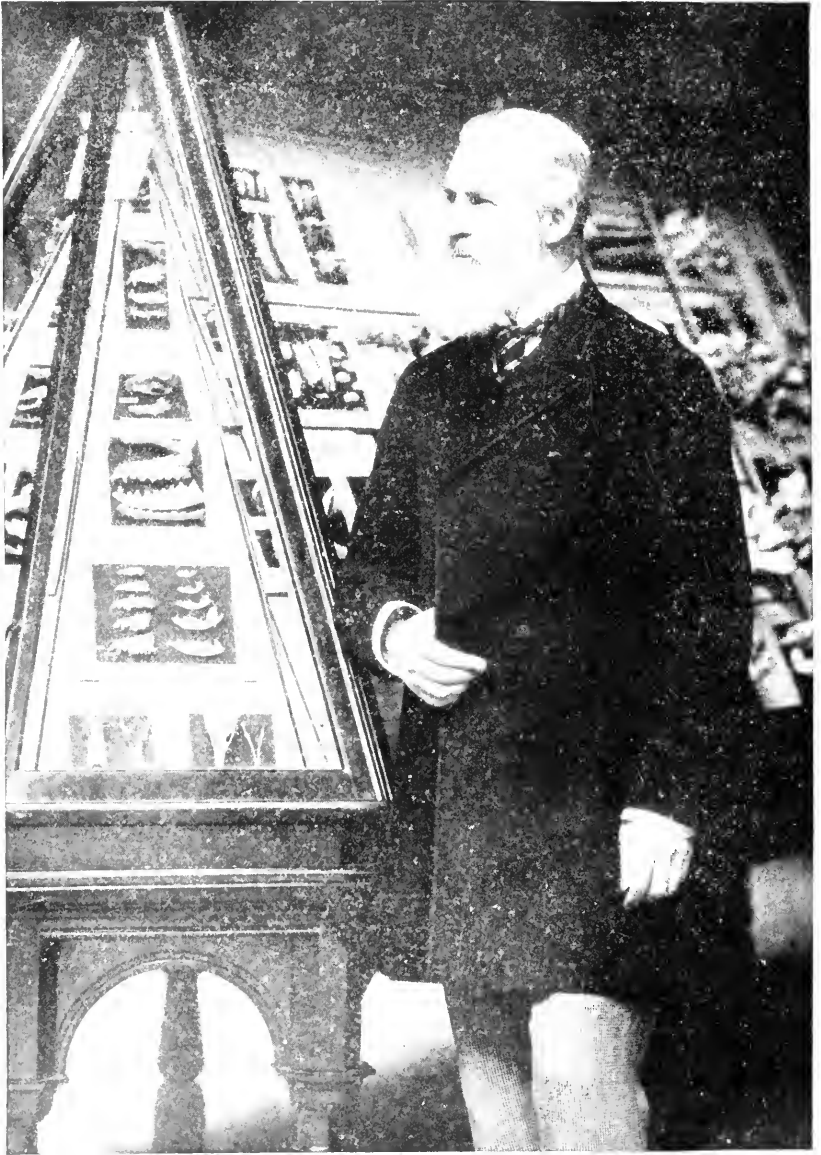
In Bryan's *Dictionary of Painters* it is stated that "Master Ryther bore the expense of the series which was published in 1579," but in Daines Barrington's copy of the Atlas in the Library of the Society of Antiquaries there is a manuscript note to the effect that the work was "made chiefly at the expense of Sir Thomas Seckford." This statement appears to be supported by the fact that the maps were dedicated to Queen Elizabeth and adorned with the Royal Arms and those of "Master Sekeford": whom Walpole describes as the promoter.

Timperley, in his *Dictionary of Painters*, confirms Walpole's statement. I am inclined to think that the statement in Bryan is incorrect and that "Master Ryther" is a typographical error for "Master Seckford." What is intended is that Ryther was the publisher, for I find that a person by name Augustine Ryther published some of the maps of the Spanish invasion and kept a shop near Leadenhall, next to the sign of the Tower.

Ryther was also an engraver and had the chief hand in producing the maps of Cumberland, Durham, Westmoreland, and Yorkshire included in Saxton's *Atlas*. It is somewhat strange that no record is entered in the Stationer's Company of the registration of the *Atlas* or of any other work having been produced by Saxton.

A portrait of Thomas Seckford appears in Vertue's print of the Court of Wards. I have been unable to trace any portrait of Christopher Saxton. The Essex Map exhibited by me at the meeting of the Club was engraved by Leonard Terwoort and is dated 1576.

I have not been successful in tracing the date or place of death of our first cartographer, but he was alive as late as 1596, when he measured and described the town of Manchester. Saxton was married, and left sons who died without issue, and a daughter Grace, who married Thomas Nalson, of Altofts, Yorkshire.



SIR WILLIAM HENRY FLOWER, K.C.B., F.R.S.

OBITUARY NOTICES.

We have lately mourned the loss by death of several prominent members of the Club. It is proposed to publish short memoirs of these deceased members, with portraits. Two of these are here given and others will follow in future parts.—ED.]

THE LATE SIR WILLIAM HENRY FLOWER, *K.C.B., F.R.S., &c.*

[*With Plate VI.*]

By the death of Sir William Flower, which occurred at his residence in Stanhope Gardens on the 1st July, 1899, we have lost one of our most distinguished Honorary Members; who has been among us and rendered good service on various occasions, and also contributed to our Journal.

Kindly by nature, he was always as ready to receive as to impart information concerning his life-study, Zoology; and to those who knew him well, his friendship was a true and real pleasure.

The ordinary facts of his career have been so fully detailed in obituary notices that we need scarcely dwell upon them here. Of his lineage; he was descended from an old Hertfordshire family, latterly settled in and near the County Town. His grandfather Richard was a Brewer and Banker, and was known also as a breeder of fine sheep; he bought and resided at Marden Hall, a small estate in Tewin parish, near Hertford; from 1809 to 1817. He appears to have been somewhat eccentric, and in the latter year sold the property; and with his son, the late Edward Fordham Flower, then aged 12, emigrated to Illinois, U.S. The son, however, returned to England in 1824; was married in 1827 to Celina, eldest daughter of John Greaves, of Radford House, near Leamington; and settled at Stratford-on-Avon, where he founded the well-known Brewery, and there his three sons were born. In later years he lived mostly in London, and was famous for his crusade against the use of the bearing-rein for horses.

Sir William, his second son, was born in November, 1831. Having no taste for his father's business as he grew up, he matriculated at University College, London, where he subsequently qualified as a Surgeon; and took the Gold Medal for Physiology, and the Silver one for Zoology.

The outbreak of the Crimean War having then caused a demand for Army-Surgeons, induced him to join the 63rd Regiment in the capacity of Assistant; and he served throughout the whole campaign, suffering those terrible trials in field and trench which had such an unfortunate and lasting effect upon his health to the close.

On his return, with the Crimean Medal and clasps for all the great battles from Alma to Sevastopol; he spent some years as Assistant, and Demonstrator in Anatomy at the Middlesex Hospital, and became Curator of its Museum. In 1861 he succeeded Professor Owen as Conservator of the Museum at the Royal College of Surgeons; and in 1870 (on Owen's appoint-

ment to the British Museum) also succeeded him in the Hunterian Professorship, retaining both positions and residing at the College in Lincoln's Inn Fields, until in 1884, after 22 years, he again followed in the track of Sir Richard Owen, as Director of the Natural History Museum at South Kensington.

Professor Flower married in 1858 a daughter of Admiral Smyth, F.R.S., Hydrographer to the Navy, by whom he leaves a numerous family. His eldest son, Stanley, named after and christened by the late Dean Stanley, who was an intimate friend of Flowers, is now Conservator of the Zoological Gardens in Cairo.

Many honours were conferred upon him. He was elected a Fellow of the Zoological Society in 1851, of the Royal Society in 1864, receiving their Gold Medal in 1882; and on the Jubilee of the Queen was appointed C.B., and a Knight of the Order in 1892.

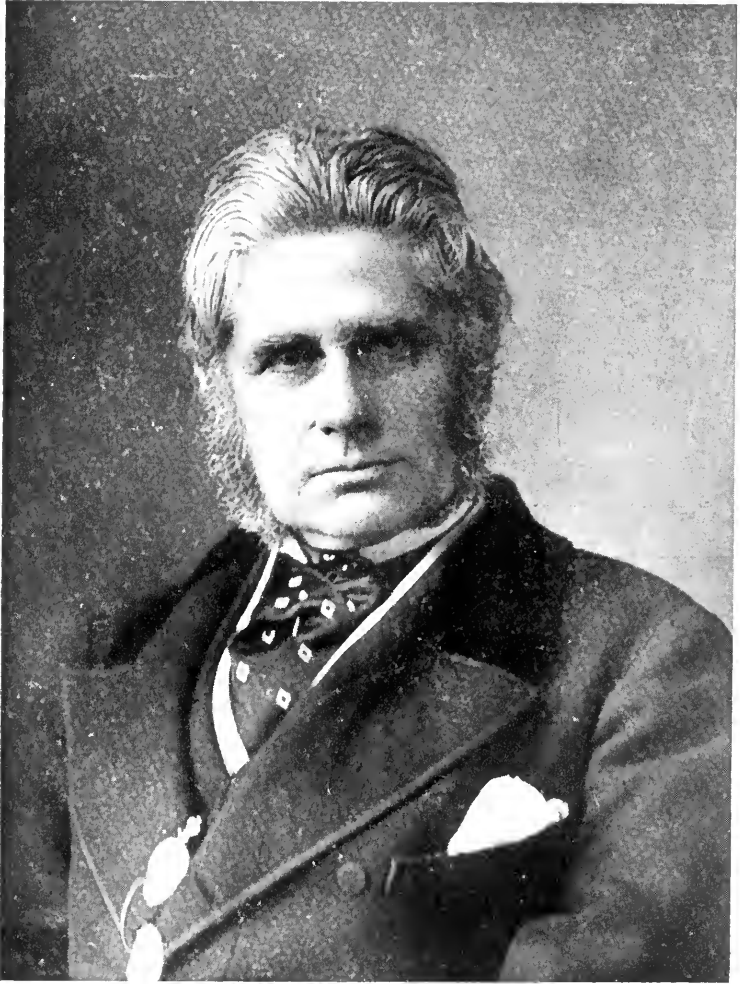
Sir William was essentially (to quote his own phrase) a "Museum-man." Even as a youth he made Collections which were all carefully arranged, labelled, and catalogued; as he graphically described in an article in *Chambers's Journal* (April, 1897), entitled—"Natural History as a Vocation."

Thus by nature orderly and careful in all things he well fulfilled in public life the well-known aphorism of Goëthe—"Ohne hast, ohne rast," and during his whole career that was the secret of his success in all he undertook. In him the rare combination of knowledge and scientific capacity, with perfect courtesy and business tact were well displayed. At all times, whether in the Professorial Chair or amid the varied duties of Museum work, either at the Royal College (where the writer first made his acquaintance), or at South Kensington, his careful, methodical, and patient work was ever faithfully performed and merited unstinted praise.

But the strain involved in the management and arrangement of the Natural History Museum, which was by no means an idle task to such a worker, proved at last too great for his physical strength, which had always suffered from his experiences in the Crimea. The collapse came suddenly, and he was compelled, though reluctantly enough, to tender his resignation and withdraw from all active work, in August, 1898. After wintering in San Remo, he returned to London in May; but his health gradually weakened to the end.

Before his connection with the Museum ceased, however, he had one great source of gratification. For many years he had persistently urged upon the Trustees, and through them the Treasury, the necessity of a suitable room for the display of the larger Cetaceans; but without effect. This desire was fulfilled, during the last two years of his service, by the erection of a large building, in which he arranged the principal typical forms; and the "Whale Gallery" was opened, much to his satisfaction a little while before his resignation; he having thus accomplished what his predecessor, Sir Richard Owen, declared to be "the dream of his life."

For over twenty years he was President of the Zoological Society, having been first elected in 1879. During this time, save for the last twelve months, when his health and sojourn abroad forbade, he was rarely absent from the Council meetings or the Evening Scientific gatherings; and the more active Fellows are fully aware how through those years his help and influence not



A. PITT RIVERS.



alone maintained the efficiency, but largely added to the strength and good work, and the great prosperity which it has attained under his guidance.

It would be impossible to give here the bare titles of the numerous books and articles from his pen. There are 89 entries in the Royal Society's *Catalogue of Scientific Papers*; and it is notable how largely his contributions have added to our knowledge of the various species and homology of the Cetaceans.

The portrait which we reproduce is certainly the best ever taken of him and was photographed by Elliott and Fry, in 1889. It is somewhat reduced in proportion, and forms but part of the original, which was taken in the Central Hall against one of the Cases in the Index Museum, the arrangements and actual details of which had been so largely the work of his own hands. We are greatly indebted to the Editor of the *Zoologist* for permission to reproduce this portrait.

A Memorial Service was held in the Church of St. Luke, Chelsea, on the 5th July, when his friend Dr. Gregory, the Dean of Westminster, officiated; and at the same time the remains were cremated at Woking: being subsequently buried in the Churchyard of Stone, Bucks.

With the consent of the Trustees it is proposed to erect a Memorial in the Whale Room of the Museum as a token of regard for the great services he rendered to science. It will consist of a Bust in Marble, and a Brass Tablet, the cost being defrayed by Subscription.

Personally I shall ever feel grateful for the help and encouragement he extended for so many years, especially in connection with the interesting group of Whales and Dolphins. While I am also indebted to him for many facts and details regarding his family connections with the County of Hertfordshire.¹

WALTER CROUCH.

THE LATE LIEUT.-GENERAL PITT-RIVERS,
D.C.L., F.R.S.

By the death of Gen. Pitt-Rivers the Essex Field Club have to deplore not only the loss of a prominent man of science but also of an old and tried friend. The deceased General was for many years an Honorary Member of the Club and he will long be remembered for the interest he took in its work and more especially for his generosity and advice in connection with the excavations of Loughton Camp and Amesbury Banks.

General Pitt-Rivers will possibly be better known by many as Colonel Lane Fox, under which name he had contributed greatly to anthropological

¹ Some facts are worthy of note in regard to some of his family connections. His great Uncle, Benjamin Flower, (1755-1829), was a noted man, a Political Writer and Editor of the *Cambridge Intelligencer*. He was prosecuted for libel by the House of Lords in 1799, for which he spent six months in Newgate, and had to pay a fine of £100. Later on he settled at Harlow, and produced the, *Political Register* in 1807. Of his two daughters, Sarah who was married to William Bridger Adams in 1834, was a poetess; and the authoress of the famous Hymn "Nearer my God to Thee," and "He sendeth sun, He sendeth showers." Her elder sister Eliza was a musical composer, and is still well remembered by the fine quartette "Now pray we for our Country."

science. Among other distinctions the General was elected a Fellow of the Royal Society, had the title of D.C.L. conferred on him by Oxford University and was for many years the President of the Anthropological Institute.

He was born in 1827 and commenced his career of antiquarian research under the guidance of Canon Greenwell during his explorations on the Yorkshire Wolds. Among the pioneers who followed up the startling discoveries of M. Boucher de Perthes, the General was the first to find palæolithic implements in the Thames valley near London, an account of which was given in an important paper read at the Geological Society, 1872,¹ and which attracted much notice.

In 1881 he made the fortunate discovery of flint flakes and an implement



From a bust executed by the late J. E. BOEHM. R.A.

embedded in the gravel of the Nile at Thebes. The Egyptians had cut their tombs in this gravel after it had become indurated and it was from the sides of these tombs that Gen. Pitt-Rivers chiselled the implements out of gravel beneath stratified seams of sand and loam, thereby proving the use of flint implements before the time of the building of Thebes and that they were contemporaneous with the gravel in which the tombs were found. (*Jour. Anthropol. Inst.* (1882), Vol. xi., p. 382).

In 1866 Gen. Pitt-Rivers drew attention to the discovery of piles found near London Wall and Southwark in a paper read at the Anthropological Institute, to which Munro has fully referred in his *Lake Dwellings of Europe*.

¹ *Trans. Geol. Soc.*, vol. xxviii., p. 449.

Among the earlier excavations carried out by the General should be mentioned those of Mount Caburn, Cissbury, and Cæsar's Camps in Sussex. These remains, although not so elaborately excavated and reported upon as those sites explored later, are nevertheless very important. The exploration of Cissbury proved to be of special interest and revealed that the camp itself had been formed in pre-Roman times but that this was, overlying an earlier Neolithic Flint Mine, some of the implements from which showed great resemblance to palæolithic types. Punches and wedges formed from tines and fragments of deer-horn were found in the galleries of the mine, indicating the method by which the flints had been procured. A report of this exploration was published in the *Journal of the Anthropol. Inst.* in 1875.

Gen. Pitt-Rivers was appointed Inspector of Ancient Monuments for Great Britain, and in 1884 carried out some excavations in the Pen Pits, near Penselwood, in Somerset, for the purpose of ascertaining whether these ancient pits should be placed under the Ancient Monuments Act. In his capacity as Inspector the General did much good work and succeeded in obtaining the permission of owners to place many important monuments under the protection provided by the Act.

It was perhaps as a collector that Gen. Pitt-Rivers was most brilliant, his wide and diversified learning, combined with a special power of observing ethnic changes, served to constitute him a scientific collector of the highest order. He had strong convictions as to the educational value of museums and insisted on the need of a museum in London for educational purposes apart from the large national collections which are essentially store houses for research. His idea was that in an educational museum, the development of any species in natural history or the history of any art or industry should be demonstrated by means of objects arranged in sequence, showing the successive changes that have taken place during their progress to perfection. By this means those having but a rudimentary knowledge would unconsciously be educated, by means of the eye, to form a correct knowledge of history and the process of evolution which knowledge they would be able to apply to other matters. With the object of founding a museum of this description, Gen. Pitt-Rivers offered to the nation his large and valuable anthropological collection (the gathering together of which had occupied him the greater part of his life) on the condition that it should form the nucleus of an educational institution. Although the idea was well received in many quarters, the Government rejected the offer, on the ground that it was undesirable to have two separate ethnographical museums in London. The collection was exhibited for some years at South Kensington and Bethnal Green Museums, but was eventually presented to the University of Oxford.

There is one feature of this collection to which special reference should be made; that is the illustration of the origin and development of decorative art. It is largely owing to these striking series in his collection exemplifying the Evolution of Design that has led many to devote themselves to this study with excellent results. Papers by the General on this subject will be found in the *Jour. Anthropol. Inst.*, vol. iv., p. 293; *Proc. Royal Inst.*, vii., pt. 6.

As an example of the manner in which the General brought his powers of observation and varied knowledge of things to bear on his system of collecting one cannot do better than turn to his *Development and Distribution of Primitive*.

Locks and Keys, 1883, which is illustrated by drawings of specimens from the collection referred to above.

Later, on taking up his residence at "Rushmore," in Wiltshire, the General set himself to form a local museum, which he established at the neighbouring village of Farnham. For this purpose he withdrew from his other collection the objects relating to agriculture, to which he has since considerably added and this museum now contains a splendid collection of peasant objects and agricultural appliances from all parts of the world. Here also are preserved all the relics from the excavations, illustrating which are numerous models showing the sites excavated and the position of the objects discovered. This forms a perfect means of studying the antiquities of the district. As a



Rushmore House, near Salisbury, Wilts.

local educational institution the Farnham museum has proved a great success, the interest of the people being aroused by seeing objects with which they are so familiar. It is visited on Sundays by great numbers of people of the neighbourhood from many miles around. In order to promote a more enlightened manner of spending Sunday the General, in addition to the museum, also opened a pleasure garden in which a band, composed of work people on the estate, played selections of music. This had a tendency to destroy the practice among the natives of standing at the cross-roads to grin at the passers by, a time honoured institution, but the discontinuance of which will cause no regret to students of folk-customs.

In 1880 Gen. Pitt-Rivers succeeded to the estate of Lord Rivers, at Rushmore, near Salisbury, by descent from his grandmother, who was the

daughter of the first lord. He was bound by the terms of the will to take the arms and name of Pitt-Rivers. This property, situated on the southern slopes of the Wiltshire downs, has owing to a combination of favourable circumstances, preserved intact the many ancient remains with which it abounds. Agriculture which has obliterated such antiquities in most parts, has, in consequence of the poverty of the soil, done little to disturb the original character of these monuments of the past in the neighbourhood of Rushmore. A large portion of the estate also has been saved from disturbance, by the existence of Cranborne Chase, a part of the original forest of the country, which was formerly protected by special laws, that forbade the conversion of the land into arable. It seems singularly appropriate that one with such acquirements and experience, should have succeeded to this estate. Gen. Pitt-Rivers himself says in the preface of the first volume of his researches in this district:—"I had an ample harvest before me and with the particular tastes that I had cultivated, it almost seemed to me as if some unseen hand had trained me up to be the possessor of such a property, which up to within a short time of my inheriting it I had little reason to expect."

The health of the General was at this time giving way and while probably he would have been precluded from carrying out such work in distant spots he was able at Rushmore to continuously and systematically pursue these explorations with the great advantages derived from permanent residence in a district.

The record of this later work is contained in four handsome volumes, copies of which the Essex Field Club library is, through the generosity of the General, fortunate enough to possess. Some critics have quarrelled with the great elaboration and detail of these works. The author, however, considered it better to err on the side of redundancy, noting much that may appear insignificant to us at present, but which may at some future time of more developed knowledge in these matters prove to be valuable historic evidence. He himself says in the introduction to Vol. I. :—"It will, perhaps, be thought by some that I have recorded the excavation of this village [Woodcuts] and the finds that have been made in it with unnecessary fulness, and I am aware that I have done it in greater detail than has been customary but my experience as an excavator has led me to think that investigations of this nature are not generally sufficiently searching, and that much valuable evidence is lost by omitting to record them carefully."

"Excavators, as a rule, record only those things which appear to them important at the time, but fresh problems in Archæology and Anthropology are constantly arising, and it can hardly fail to have escaped the notice of anthropologists, especially those who, like myself, have been concerned with the morphology of art, that, on turning back to old accounts in search of evidence, the points which would have been most valuable have been passed over from being thought uninteresting at the time."

The spirit which actuated the General in his researches was solely the genuine scientific idea of gaining historic evidence and he had a most healthy contempt for the spirit of relic grubbing and curiosity collecting. "In my judgment," he says, "a fragment of pottery, if it throws light on the history of our own country and people, is of more interest to the scientific collector of evidence in England, than even a work of art and merit that is associated only with races that we are remotely connected with."

These volumes, descriptive of the Cranborne Chase explorations, are most useful books of reference and exponents of the value of apparently insignificant relics in providing material for filling in the missing pages of our history. Nothing perhaps of their kind have been so thorough and so completely successful. The systematic care with which these researches were carried out, the exact record of facts and absence of hastily drawn conclusions are apparent from the books themselves, but only those who have actually worked with General Pitt-Rivers can appreciate to the full how faithfully he maintained the high standard he had set himself in these records, and how steadily he refused to strain facts to fit preconceived hypotheses however tempting they might appear. The present writer can fully testify to this, having had the honour, during several years, to assist in these researches. No discrepancy, no error, was tolerated. "A mistake," he would exclaim, "what is a mistake? In my profession Sir, a mistake is looked upon as a crime and that is the idea I wish to inculcate in you." The importance of exactitude in minor things was no doubt the more necessary where the evidence was often of so slight a nature. Doubtless these works, in addition to their value as books of reference, will exert a beneficial influence on future explorations, as showing the importance of exact record of objects that appear in themselves so little deserving of notice.

Gough in his *History of Carausius* remarks "The science of antiquities has been involved in the systematical fatality of the age. Every research after truth has degenerated into contest for an hypothesis. Of all enquirers after it antiquarians, to whose discoveries some deference is presumed to be due, should quarrel least. Much less should they substitute fancy and imagination to that fiction and obscurity they labour to banish."

This desire to state only established and supported facts was a quality possessed by the General in a very high degree, and he proportionately despised those who speculate with insufficient data. "We are not without our Stukeleys at the present time, when the progress of science has lessened the excuse for us," he remarked in his address to the Royal Archæological Institute.

As characteristic of this love of truth there is a tale the villagers of Tollard Royal delight to relate, how the Parson attempted in a sermon, at which the General was present, to distort science to fit some passage of Scripture, which extorted from him the emphatic protest of "That is a lie!"

There was never any desire to jump at conclusions; he was always prepared to wait quietly until all the evidence had been collected, before formulating any generalisation. Alluding to this subject he says:—"I think it undesirable to give expression to theories which one may afterwards feel one's self committed to, as the investigation goes on" and again "I have often noticed in my younger sporting days and it is a fact well known to sportsmen, that some hounds are apt to give tongue before they have got a true scent, whilst there are others whose voice can be relied upon. I am an old dog and have always had a disposition to run mute."

It is this system, by which the record of a plain statement of just what was found, unmixed with immature theorising, that gives such value to the Cranborne Chase volumes for those who may in future pursue this line of archæological enquiry, *i.e.*, the history of the Early British Village. For although there will be found the record of numerous barrows, the Anglo-Saxon

cemetery of Winkelbury, Bockerly Dyke, and the Wandsdyke, it is principally the villages or camps of the Bronze and the Romano-British ages that are described in these volumes. Several Bronze Age camps have been excavated, and the occurrence of vessels and quantities of fragments of pottery, similar to that found in the barrows, serves to dispel the idea, held by some, that such vessels were fabricated solely for sepulchral purposes and show conclusively that such pottery was in common use. There are the settlements of Woodcuts, Rotherly and Vindogladia, the latter with which Bockerly Dyke is associated, besides portions of the remains of other Romano-British villages, all producing relics and skeletons with marked characteristics, distinct from those of the Bronze Age. The relics procured from the villages were, relatively to the vast amount of excavation necessarily undertaken, small in quantity and poor in description, it is therefore the more to the credit of Gen. Pitt-Rivers that he persevered so continuously in the exploration of such sites. They were such as would perhaps present but few attractions to most excavators, looking for greater compensation in the shape of numerous and imposing relics.

Not the least important of the results of these excavations are the measurements obtained from the human remains. A large number of skeletons of the Stone and Bronze Ages, and the Romano-British and Saxon periods, have been discovered and carefully measured. These data constitute an invaluable contribution to anthropometrical science. Pitt-Rivers had to contend with much opposition from well meaning but unscientific people concerning the unearthing of human skeletons. On one occasion a local clergyman came to him and begged that he would cease disturbing human remains. On the reasons for doing so being explained to him, he requested, that after the measurements had been obtained, the bones might be re-interred in his churchyard. "My dear sir," exclaimed the General, "are you aware that these people were pagans? Would you have pagans buried in consecrated ground?" This apparently removed any scruples the reverend gentleman may have had, for he never troubled further in the cause of the early Britons.

The great care taken in recording all that was found, has furnished a mass of evidence which throws considerable light on the nature and social condition of our pastoral predecessors. Though much remains to be done and similar explorations are, indeed, much needed in other districts to complete the story, it is not too much to say that Gen. Pitt-Rivers has given to us one of those pages of our history which Green declared himself unable to write until such researches had been undertaken.

He died on the 4th May, 1900, and was cremated at Woking; the ashes were buried at Tollard Royal Church, Wiltshire.

The excellent portrait accompanying this notice is from a photograph by Messrs. Downey and Co., and is reproduced from the third volume of the *Excavations in Cranborne Chase*.

For the photographs of the bust and Rushmore House, I am indebted to my friend and former colleague Mr. W. S. Tomkin, by whom the negatives were taken.

F. W. READER.

[Mr. Reader has kindly presented the blocks of the illustrations used in this notice.—ED.]

SOME NOTES OF THE STALK-EYED CRUSTACEA OF THE BRITISH COASTS AND REFERENCES TO ESSEX FORMS.

Abstract on an Address delivered by MR. EDWARD LOVETT, at a Meeting of the Club on February 14th. 1900.

The Stalk-eyed (Decapoda or "ten-legged" Crustacea) are divided into three groups, viz., the Brachyura or true Crabs, the Macroura or true Lobsters, Shrimps, and Prawns, and the Anomoura, embracing representatives of each of the former as illustrated by the Stone-Crab *Lithodes* and the Lobster-like *Galathea* for example; as also the Hermit-Crabs. One peculiar characteristic, however, is that the fifth pair of legs are rudimentary, and are, in fact, merely brushes, and are so used by the animals in several instances.

Of the Brachyura the best known species, and in most cases the *only* popularly known species, are the Edible Crab, *Cancer pagurus*, and the Shore Crab, *Carcinus menas*; the majority of the other British forms being seldom seen near the high-water mark.

The Spider Crabs of the genera *Stenorhynchus* and *Inachus* are very delicate in structure, and occur in deep water in the western parts of the Channel: *Stenorhynchus rostratus* is common in the Thames Estuary and the Colne Estuary, Ed. A more robust form *Hyas araneus* (and its near relative *H. coarctatus*) are the typical Essex "Spiders," as the members of the genus are always found on a sandy or muddy bottom, to which the colour of the crabs almost invariably corresponds.

Another robust "Spider" form is *Pisa gibbsii*. This species has its carapace covered with a dense mass of short fine spines, forming a sort of "pile." Thus by catching and entangling bits of Algae, spores of sponges, &c., it acquires a perfect growth of such plants, so that the animal is thereby protected from its enemies, the fishes, which although ready to eat any Crustaceans are averse to sponges and like growths.

Curiously enough this very protection sometimes brings about the destruction of the Crab, for the sponge growths gradually cover the whole animal until its death is brought about. [Specimens were exhibited to illustrate this.]

Pisa tetraodon occurs at the Nore and may be considered an Essex species.

Another interesting family are the Swimming Crabs or Portunidæ. They have the fifth pair of legs terminating in paddles, and although they do not really "swim" in the proper sense of the word, they possess the power of raising themselves from the sea bottom, and making short aquatic flights. An exception to this, however, is presented in the case of *Polybius henslowii*, which has an exceedingly thin chitinous carapace. This species has often been taken in herring-nets, a fact which proves that it must be a hardy swimmer, as its structure would lead one to expect. An exceedingly delicate member of this family is *Portumnus latipes*, a rather rare species near our coasts, but much more abundant on the French side of the Channel.

Portumnus puber, the "Lady Crab" of the Channel Islands, is a handsomely marked species: unhappily the bright colours disappear at death, so that no idea of its beauty can be formed from a dried specimen.

The Common Shore-Crab (*Carcinus mænas*) is very widely distributed and is a well-known Essex form, where its colour is invariably identical with the sandy or muddy bottom on which the creature lives. When, however, we find it in rock-pools on the granite or serpentine of Cornwall, or on the syenite or basaltic shores of the Channel Islands, this interesting species assumes the most beautiful markings, tinted with really gorgeous colour, and mottled in the most delicate manner. It is often almost impossible to detect the Crab in these localities, so perfectly does it resemble its surroundings.

The genus *Xantho* (*X. florida* and *X. rivulosa*) has its carapace very solid and strongly built up. It is found in the wildest rocky shores of the Channel Islands where the waves break, and where a more slender form could not hold its own. I have stood upon a specimen of *Xantho florida* without crushing it.

Porcellana platycheles is a very small species, somewhat dull and dirty in colour, and I have always found it on rocks much grown over with algæ, &c. Whilst *P. longicornis*, a smooth, pink-coloured species, I have found upon smooth granite boulders. Both these species have a wide distribution.

Pirimula denticulata is a small interesting species, and is considered to be very rare. When collecting in Jersey, I

happened upon a specimen and offered a reward to a fisherman of a shilling each for others. To my astonishment (and dismay!) he brought me in a few days over a hundred specimens, and informed me that when he visited his Crab-pots at about two o'clock in the morning, there was a certain sand-bank which swarmed with this little crab, at that hour, but he had never seen it elsewhere or at any other time.

The Spiny Lobster (*Palinurus quadricornis*), is the true Cray-fish, and often attains to a great size. I once measured a specimen which I saw taken in Sark. It was four feet two inches in extreme length, and eleven inches in spread of tail. This species carries an enormous mass of ova of very small size in proportion to the parent. Whilst species of much less dimensions, such as *Callinassa subterranea*, produces quite large ova, but very few in number. As, however, the latter species is greatly protected by living underneath the sand, such disparity is accounted for.

The Fresh-water Cray-fish or Craw-fish (*Astacus fluviatilis*), is found in abundance in brooks deeply cut through the clay meadows of a lime-stone district. Its real home in this country is Cricklade, in Wiltshire, where I have caught thousands of them. [The Cray-fish used to be common, and probably is so still, in the Lea and Chelmer, and is found in some of the streams of the New River Company in prodigious abundance.—Ed.] I have kept this interesting species alive for some time in a basket of stinging nettles. In an ordinary aquarium it soon dies, unless the water be very shallow.

The Common Lobster is so well-known excepting perhaps under its scientific name of *Homarus vulgaris*, that any details are unnecessary. It is very widely distributed, and although considered a delicacy, is unhappily not too discriminate as to its own feeding. Albino specimens sometimes occur, and I once had one alive for some time, which was of a pale flesh-tinted pink.

Nephrops norvegicus is a typical Dogger-Bank form of very marked characteristics. It is called a "Prawn" in Newcastle. I have frequently taken them from the stomachs of Cod-fish.

The Boring Crustaceans, Thalassinadæ, are a remarkable family, seldom seen, and never obtained except by digging in low-tide sand-banks. *Callinassa subterranea*, *Gebia deltura*, *G. stellata* and *Axius stihynchus* are the chief forms. Another boring

species, *Thia polita*, curiously enough, does not belong to this group, but is a true crab.

The Shrimps (*Crangonidæ*) and Prawns (*Palaemonidæ*) are most interesting animals and are well represented on the Essex coast. The true Shrimp, *Crangon vulgaris*, may be at once recognised by the flat cephalo-thorax and its sand-like colour. It is the "Brown Shrimp" because it does not turn red on being boiled like the prawn under like treatment.

[Mr. Lovett made the following observations in the *Zoologist* for 1885, pp. 468—9, which we have often verified when noticing shrimps in the sea-rivulets on our Essex coast:—"The colour of this species is grey or brownish-grey, speckled with darker cells of pigment, but, of course, like many crustaceans, this colour varies according to the habit of the specimens; for those from a light sandy bottom are paler and slightly yellow, whereas those from a muddy estuarine locality are dark and dirty looking: in fact, so completely does *Crangon vulgaris* resemble in tint the bottom on which it lives, that it is absolutely impossible to detect it when motionless. I have frequently observed this in shallow clear water where shrimps almost covered the sand; and yet, when not actually moving, not an outline could be traced or a single living thing seen, but on alarm hundreds of little flashes showed where these thoroughly invisible tiny things really were."]

Several other species of the genus *Crangon* occur on the Devon and Dorset coasts, but are rather rare. *Alpheus ruber*, a rare and brilliantly coloured species is found at Herm in the Channel Islands. This animal possesses the power of making a sharp clicking sound by means of a spine at the base of the first abdominal segment; much in the same fashion as that of the "skip-jack" beetle. *Athanas nitescens* is another somewhat rare species from Jersey, as also is *Hippolyte spinus*.

Pandalus annulicornis is really a "prawn" and is a typical Essex form. It is in fact the "Red Shrimp" of the Thames excursion steamers. It works the tide up and down for its food, and is a most useful scavenger. The term "Red Shrimp" is applied to several diverse species round the coast. At Southampton I saw *Palaemon squilla* (the small prawn) hawked about under this commercial name, and *P. varians*, where it occurs commonly, is also so called.

The true Prawn (*Palæmon serratus*) is also an Essex species and well known. *P. squilla* is a small form from the western part of the Channel, where it is "the Prawn."

Palæmon varians is another and decidedly Essex form, occurring in vast numbers in the creeks and inlets of this part of our coast.

[Mr. Lovett concluded his lecture by giving some practical instructions upon collecting and preserving crustaceans for the cabinet: and the methods by which he preserved the ova and zœa stages permanently for future microscopical examination. We hope to publish these notes, revised by Mr Lovett, later.

We had also intended to publish with this abstract a list of the species of Stalk-eyed Crustaceans known to occur on our Essex coast, but the catalogue is so manifestly imperfect that we await the results of another season's collecting before printing it.—ED.]

THE ESSEX FIELD CLUB.

VISIT TO THE ROYAL COLLEGE OF SURGEONS.

SATURDAY, JANUARY 27TH, 1900.

Conductor:—PROFESSOR CHARLES STEWART, M.A., F.R.S., F.L.S.

(*Hunterian Professor and Conservator of the Museum.*)

On the kind invitation of our esteemed Honorary Member, Prof. Stewart, a visit was paid on this afternoon to the Museum under his care, which is of European reputation as the repository of John Hunter's collections, and which was afterwards the scene of the labours of Quekett, Owen and Flower.

The members and visitors (a large party) assembled in the Hall of the College in Lincolns Inn Fields at 3 o'clock, and were received by Prof. Stewart, who acted as "conductor." His genius as an expositor of difficult facts in morphology and biology is well-known to most London students, and on this afternoon he kept the attention and interest of the party to the end of a long survey of this magnificent collection. It would be quite impossible to give even an idea of the riches of the Museum; for professional students there is a collection of preparations and models illustrating comparative anatomy, physiology, pathology and surgery, probably unrivalled in Europe. And for the ordinary naturalist there are many series of great interest and educational value, relating to classification, mimicry, embryology, &c. The collection of ethnological specimens is also very fine. And under Professor Stewart's care, these biological series are increasing, and are quite abreast of the most recent results of science.

The great ingenuity of many of the methods of exhibiting specimens was much commented on, and in no museum can be seen such successful "wet-preparations" as at Lincolns Inn Fields.

In proposing a vote of thanks to Professor Stewart for his lucid and admirable explanation of the contents of the Museum, Mr. Chalkley Gould referred to a tradition that O'Brian, the Irish giant, whose remains (standing 7 feet 7 inches ' in his bones') they had seen, was connected with the county of Essex by his residence for a time in Loughton—it is said at the house now occupied by Mr. McKenzie, the Superintendent of the Forest.

The vote of thanks was most cordially passed, and Prof. Stewart expressed his pleasure at meeting the members that afternoon, and said that he hoped the Museum would be taken advantage of by those studying natural history. The party then left, after passing a pleasant and most instructive afternoon.

THE 192nd ORDINARY MEETING.

WEDNESDAY, FEBRUARY 14TH, 1900.

The Meeting was held in the Small Hall of the Bishopsgate Institute, Bishopsgate Street, London, by the kind permission of the Governors of the Institute, at 7 o'clock, Mr. Walter Crouch, F.Z.S., *Vice-President*, in the Chair.

Mr. Crouch exhibited a portrait of the late Sir William Flower, F.R.S., Director of the British Museum of Natural History, and one of the Hon. Members of the Club. Mr. Crouch suggested that a short Memoir with Portrait, of Sir W. Flower, should be given in the *ESSEX NATURALIST*.

Mr. J. P. Johnson read a paper, entitled "Some New Sections in, and Contributions to the Fauna of, the River Drift of the Uphall Estate, Ilford, Essex," written by himself and Mr. G. White. Mr. Johnson exhibited specimens of the Mollusca, in illustration of his paper.

[The paper is printed in the present volume of the *ESSEX NATURALIST*, *ante* p.p. 157—160].

Mr. W. Whitaker, F.R.S., remarked how glad he was that some young observers were keeping watch on new sections as they were exposed, so carrying on the work of the Geological Survey. With regard to the 6-banded form of *Helix nemoralis*, of which Mr. White had found two specimens in the pit, he said that although he had a very large collection of varieties of this shell, he had never found a 6-banded one.

Mr. Lovett said that it would be interesting to know whether the flint flakes bearing marks of human workmanship were actually found in juxtaposition with the extinct species of Mollusca. Mr. Lovett also referred to the remarkable varieties of *Helix nemoralis* found in the Faroe Islands, where the ordinary type form seemed to be absent.

Mr. Crouch said that some years ago, when studying the Mollusca of the Becontre Hundred, he obtained over 1,500 specimens of *Helix nemoralis*, and amongst them were some very fine varieties, a few of which might be seen in the collection lent by him to the Epping Forest Museum. But he had never found a living specimen of the 6-banded form.

A vote of thanks was passed to Messrs. Johnson and White for their paper.

Mr. Edward Lovett then gave a lecture-demonstration of "The Stalk-eyed Crustacea, their families and Genera, with especial reference to the

known Essex Species." The lecture was illustrated by a series of specimens of most of the species referred to, selected from his own collection.

[An abstract of Mr. Lovett's remarks is given in the present part of the *ESSEX NATURALIST*].

Mr. W. Cole exhibited some Essex forms of Marine Crustacea, collected by himself in the Colne Estuary.

Considerable discussion took place on points in the natural history and occurrence of Crustacea, carried on by Mr. Crouch, Mr. Whitaker, Mr. F. W. Elliott, and the Author, and before the close of the Meeting a very cordial vote of thanks was passed to Mr. Lovett for his interesting lecture.

[The Secretary expressed his thanks to the Governors of the Institute for the courteous way in which accommodation had been found for the Club, The place of meeting was chosen to suit the convenience of Mr. Lovett, so as to avoid the risk of two railway journeys for his delicate specimens of Crustacea. The *day* of Meeting was an experiment, many Members having frequently complained that most of the Meetings were held on *Saturdays*.

FIELD DEMONSTRATION MEETING AND SPECIAL AND ORDINARY MEETING.

SATURDAY, MARCH 31ST, 1900.

One of the Field Demonstration Meetings was held in Epping Forest on this afternoon, under the Botanical leadership of Mr. Ernest S. Salmon. The subject was the study of the **Mosses**. The members met at Theydon Station at about a quarter past 3, and the route was taken up the hill to Oak Hill Woods.

By the wayside, growing on the sandy banks, *Aulaconnium androgynum* occurred abundantly in its gemmiferous condition, crowded with little balls of gemmæ borne at the apex of naked stalks (pseudopodia). On these banks, *Baetramia pomiformis* also grew. On reaching the Oak-hill Woods it was found that the cold winds, which had been prevalent for the past week, had somewhat dried up the mosses, and it was only in the sheltered and damper parts that any signs of Spring growth were observable. Scattered about the woods, however, were fine tufts of *Leucobryum glaucum*, and *Tetraphis pellucida*, with its bright green cups of gemmæ, grew in several places in profusion.

The way led by the "Ditches" to the "Fox Earths," where the Badger's holes (depicted in Dr. Laver's *Mammals, &c., of Essex*, plate facing page 42), were seen. Close to the stream running through "Hangboy Slade," *Fissidens eelii* was found, a rare species of the genus, and one not hitherto recorded for the Forest. This moss was in beautiful condition, its densely clustered ripe capsules on short setæ almost covering the bare clay on which it occurred. In the wetter parts of the woods, *Aulaconnium palustre* was found, whilst in the dry parts the most interesting species seen were *Polytrichum filiferum* and *Pleuroidium subulatum*.

On reaching Monks Wood, a halt was called under the beeches, and a short lecture on Mosses was given by Mr. Salmon. In his remarks, directions were given as to the best manner of examining mosses, and attention was

directed to the principal points on which classification is based. After having described the separate parts of a moss, a short account of the life history was given. Starting from the germination of the spore, the development was followed up to the production of the male and female reproductive organs, *i.e.*, the antheridia and archegonia. The process of fertilization was described, and the resulting growth of the moss "fruit,"—the capsule, with its seta, &c. It was pointed out how clearly mosses, in their life-history, afford an example of the phenomenon known as the "Alternation of Generations." The leafy stem (originating from a spore and untimely producing male and female reproductive organs), known popularly as the "moss," is the gametophyte (gametophytic or sexual generation); the capsule, with its asexually produced spores, peristome, seta, &c.,—known popularly as the moss "fruit,"—is the sporophyte (sporophytic or asexual generation).

The ramble was then continued over Dulsmead to the "Wake Arms" for tea. Between Monks Wood and this point, large patches of *Brachythecium albicans* were found growing among the grass.

After tea at the inn, an Ordinary Meeting (the 193rd), and a SPECIAL MEETING were held, Prof. R. Meldola, F.R.S., *Vice-President*, in the Chair.

The notice convening the Special Meeting was read, and Mr. W. Cole, on behalf of the Council, proposed that Rule xxxvii. should be temporarily suspended for the purpose of adjourning the ANNUAL MEETING to some future date, to be determined by the Council.

The Chairman explained that this step had been rendered necessary by the immense amount of work thrown upon their Hon. Secretary, in connection with the negotiations and arrangement of the two Museums of the Club, the business of which had suddenly come to a head during the early part of the year.

The resolution was seconded by Mr. George E. Vaughan, and carried unanimously.

At the Ordinary Meeting, the following were elected Members of the Club:—Mrs. Margaret Colsell, Mr. J. Edge Partington, F.Auth.Inst., and Mr. Harold Picton, B.Sc., F.C.S.

The Rev. W. C. Howell proposed that the members should send a congratulatory letter to Lord Avebury (better known as Sir John Lubbock) on the recent honour conferred upon him by the Queen. Mr. Howell referred to the great encouragement given by Lord Avebury to the study of out-of-door natural history, by his numerous popular works on these subjects, and also by his successful exertions in the promotion of holidays which afforded leisure to workers.

Mr. Avery seconded the proposal, and after a few remarks from the Chairman, it was agreed to unanimously.

Mr. Robert Paulson then gave an extemporary exposition of certain new views of the action and nature of pollination in flowering plants, which were the outcome of recent researches, and which seemed likely to wholly change some theories previously held on this subject.

Prof. Meldola made some remarks, and thanked Mr. Paulson for his lucid explanations

The Secretary gave notice, on behalf of the Council, that *on and after the 1st of May next*, the HEAD QUARTERS and PUBLISHING OFFICE of the Club would be at the "Essex Local and Educational Museum of Natural History of the Essex Field Club" (*Passmore Edwards Museum*) THE ROMFORD HIGH ROAD, STRATFORD, ESSEX.

The Meeting then broke up, and some Members of the party went to Theydon Station, while others walked through the forest roads to Loughton.

JOINT MEETING ON THE FOREST WITH THE CROYDON NATURAL HISTORY CLUB.

SATURDAY, MAY 19TH, 1900.

The main "idea" of this meeting was not only to welcome our friends of the Croydon Club (of which our esteemed Hon. Member, Mr. W. Whitaker, F.R.S., is President, and with whom we had a ramble last year in their own County at Charlton), but also to make a commencement of the observation of the Micro-fungi of the County, in accordance with the suggestions made by Dr. Cooke in his paper, "Suggestions on the Collecting and Study of the Minute Fungi of Essex" (*ESSEX NATURALIST*, Vol. IV. pp. 28-39), and more particularly by Mr. Masee at our last Fungus Foray (E.N. XI. pp. 166 and 196, where a list of suitable books for the student was given). Mr. Masee very kindly undertook to aid the observations of those Members wishful to take up the study of these exceedingly interesting plants. Preliminary lists will be found in former volumes of our journal:—*Ustilaginei* and *Æcidiumycetes* (by Dr. Cooke) in Vol. I., pp. 184-186; *Cryptogamic Flora of Kelvedon* (by Dr. Varenne) Vol. V. pp. 20-24; and the *Discomycetes* known to occur were listed by Dr. Cooke in Vol. II., pp. 189-192.

Mr. Masee acted as Referee on this occasion, and Mr. N. F. Robarts and Mr. F. J. Townend represented the officials of the Croydon Society.

The large party met at Loughton Station at about 3 o'clock, and at once started on an extended ramble through some of the most beautiful parts of the Forest. It is unnecessary to describe the ramble, which was similar to many others undertaken by the Club. The woods were most inviting in the fresh loveliness of the Spring, and strangers to the forest were loud in their expressions of surprise and pleasure at the wildness and charm of a district so near London. Collecting of botanical and microscopical specimens was carried out during the afternoon.

Mr. Masee reports that the species of Microscopical Fungi observed during the afternoon were as follows:—

- Cenangium fulvaceum*, Fries. On holly.
- Ascobolus aeruginus*, Fries. On horse-dung.
- Ascophanus argenteus*, Bond. On cow-dung.
- Pseudopeziza trifolii*, Fckl. On living clover leaves.
- Mollisia cinerea*, Karst. On dead wood.
- Erinella nylanderii*, Rehm. On dead nettle stems.
- Dasysepha bicolor*, Fckl. On dead branches of hornbeam.
- D. nivea*, Masee. On dead wood.

Baylæa cinnabarina, Sacc. On the ground among moss.

Eurotium habariorum, Link. On rotten leaves.

Eutypha flavo-virescens, Tul. On the bark of hornbeam.

Diatrypa stigma, Fries. On hornbeam bark.

Tubercularia vulgaris, Tode. On fallen branches of beach.

At about 6 o'clock the ramble terminated at the "King's Oak" Hotel, High Beach, where tea had been provided.

AN ORDINARY MEETING of the Club (the 194th) was held for the election of New Members, Mr. D. Howard, President, in the Chair.

The following were elected Members :- Messrs. W. H. Baddeley, A. E. Briscoe, B.Sc., &c., Henry Hills, B.A., B.Sc., E. J. Lewis, F.E.S., Walter Robins, B.Sc., &c., F. G. Sinclair, M.A., F.L.S., and Robert Swaby, Barrister-at-Law.

Mr. Howard expressed the pleasure of the Members of the Essex Field Club at the company of the Croydon Natural History Society, and congratulated those present on the fine afternoon, and the very large attendance at the meeting.

Mr. N. F. Roberts, F.G.S., replied on behalf of the Croydon Natural History Society.

Mr. Masee gave a short address on the study of the Minute Forms of Fungi, and alluded to the great importance of the subject, in view of the very serious injuries occasioned to field and garden crops by fungoid parasites. He offered to do all in his power to assist any Members intending to take up the study of this great group of plants in an intelligent and serious manner.

Mr. W. Cole exhibited three specimens of *Vivifera clactonensis*, S. Wood, of which species five specimens had been detected by Mr. W. M. Webb in a small set of Pleistocene shells collected by the Rev. J. W. Kenworthy, at Clacton, Essex, and presented by him to the Club. Previously only two specimens were known, which were in the Woodwardian Museum at Cambridge. Of the five specimens presented by Mr. Kenworthy, two had been placed in the British Museum, and the three exhibited would be added to the collection of Pleistocene Mollusca in the Club's County Museum at Stratford.

Mr. Cole also exhibited on behalf of Mr. Edwin E. Turner, of Coggeshall, two species of Micro-Fungi new to the Essex list, viz.: *Puccinia betonicæ* from Great Totham, and *Æcidium leucospermum* from Witham. Mr. Turner had kindly presented these specimens to the herbarium of the Club.

After the meeting, the large party broke up into detachments, and rambled home through the forest to Loughton, Chingford, and Buckhurst Hill.

VISIT TO CANVEY ISLAND, AND 195th ORDINARY MEETING.

SATURDAY, JUNE 30TH, 1900.

In July last year, the Club visited Foulness Island, and the meeting was much appreciated; the present meeting was intended to afford members an opportunity of seeing another of these alluvial districts of Essex which have been rescued from the waste of the sea by the skill of man. As a walk across

the island and back again would be long and, in the absence of the shade of trees, somewhat fatiguing, it was proposed to approach Canvey from the Thames Estuary side and then to walk through to Benfleet.

Accordingly an excellent sailing boat was engaged to convey the party (a very small one) from Southend Pier to the island. The start was made at about three o'clock, and as there was a fine fresh breeze, an exceedingly enjoyable sail was obtained to the Chapman Sands, at Canvey. The party was landed in a row boat, and then a ramble along the shore to Hole Haven was taken. There is a Coast Guard Station here, and a somewhat celebrated rustic inn, the "Lobster Smack," concerning which some stories of the old smuggling days are current. This part of the Thames Estuary has been frequently mentioned in fiction. The marshes of Cliff and Cooling on the Kentish shore are very graphically described in Dickens' *Great Expectations*. Canvey Island and its neighbourhood figures largely in Mr. Coulson Kerwahan's *Captain Shannon*, and in Mr. Robert Buchanan's *Andromeda*, the last-named work being a publication of the present year.

The walk along the shore proved that with time to make a careful search many interesting objects of natural history could be found. The commoner species of mollusca were very much in evidence, and several somewhat infrequent species of littoral plants were noticed.

Mr. T. S. Holmes had intended to be present, but most unfortunately failed to come up with the party in a walk across the island. He has, however, furnished the following sketch of the geology of the district, which he had intended to demonstrate at the meeting:—"If we glance at a geological map of Canvey Island and the district within a radius of ten miles around it, showing the drift or superficial beds as well as the older formations, we see that Canvey Island consists solely of the latest of all, the alluvium of the Thames, of which the adjacent marshes of Bowers, Pitsea, Vange' Fobbing, and Corringham are also composed. If we then proceed to note the distribution of the older deposits of the Thames in this district we see a curious break in their continuity between Fobbing on the west, and Leigh eastward, the river having, since their deposition, taken a northward turn from Fobbing to Pitsea and thence eastward to Benfleet and Hadleigh, sweeping away in its course its own older gravel and brickearth and leaving the more recent alluvium of the marshes in its place. North of Canvey Island we find London Clay; capped between Hadleigh and Rayleigh by beds of the Bagshot Series, which are covered here and there, in their turn, by patches of gravel, representing locally the Westleton beds of the late Sir Joseph Prestwich. The highest ground in the district is thus formed both between Hadleigh and Rayleigh, and at Laindon Hills, a few miles to the west. The London Clay attains a thickness at Rayleigh of 400 ft. On the Kentish shore at Cliffe the Chalk forms a cliff some 300 or 400 ft. above the marsh, and may be seen on the Essex side about East Tilbury at a slightly lower elevation. But a boring at Thames Haven, in the marsh west of Canvey Island, gave a section, of which that below is an abstract. (Whitaker: *Geol. Lond.* Vol. 2 p 36.) The boring is on the marsh, about 450 ft. from the river bank.¹

¹ See *Trans Essex F. Club* vol. iv. p. 64.

Alluvium?	..	..	50 ft. 9 in.	..	..	Depth.
Valley Gravel?	..	..	27 „ 6 „	..	..
London Clay?	..	..	40 „ 3 „	..	..
Oldhaven Beds?	..	..	5 „ 3 „	..	..
Woolwich Beds	..	..	33 „ 3 „	..	..
Thanet Beds	..	..	111 „ 6 „	..	..
Green-coated Flints	..	—	„ 6 „	..	=	268 6
In Chalk	..	..	303 „ 6 „	..	..	572 0

“ Mr. Whittaker remarks that it is difficult to make out the subdivisions of the Lower London Tertiary rocks. However, the chief point of interest is the fact that between Cliffe and Thames Haven, a distance of three miles, the top of the Chalk instead of being 30 or 40 ft. above the surface of the marsh, has descended to a depth of 268 ft. 6in. below it. To this northerly dip of the Chalk we doubtless owe the great development of marsh east of Cliffe and East Tilbury as compared with that visible between East Tilbury and Purfleet, where the Chalk is above O.D. on both sides of the river. The Thames has eroded away the soft Tertiary and later beds more easily than the harder Chalk, and has left the marshes and old channels of Canvey Island, and those nearer Corringham, Fobbing, and Pitsea, as records of its course in times prehistoric, though geologically recent.”

From Hole Haven the party turned inland and walked across Canvey to South Benfleet. The prospect of the high grounds of Benfleet and Leigh was much admired. There are but few trees on the island, and the hedges are low and largely formed of blackthorn. During a walk taken through the island by the Secretaries a few weeks earlier, an astonishing number of “ nests ” of the gregarious larva: *Clisiocampa lanestrís* and *C. neustria* were observed. On the day of the meeting many of the nests were deserted, but they were still greatly in evidence. Amid the long grass on some of the banks, solitary specimens of the Grass Vetch (*Lathyrus ulissolia*) were observed.

At Benfleet tea was taken at the “ Hoy ” inn, and afterwards an ORDINARY MEETING (the 195th) was held, Mr. G. E. Vaughan, Member of the Council in the chair.

The following were elected members of the Club — Miss Kate M. Hall, Mr. W. J. Hiam, Mrs. Hiam, and Mrs. S. Scott.

The only other business was the nomination of OFFICERS and MEMBERS of COUNCIL preparatory to the Annual Meeting, which had been postponed as indicated at a previous meeting.

The following Members of Council retired under the Rules, but offered themselves for re-election;—Messrs. Andrew Johnston, J. P.; J. Spiller, F.C.S., F.I.C.; F. H. Varley, F.R.A.S., &c., and J. C. Shenstone.

There were two vacancies by the resignation of Mr. J. H. Porter and the much regretted death of Mr. T. Hay Wilson.

The Secretary, on behalf of the Council, nominated Messrs. Johnston, J. Spiller, F. H. Varley, and J. C. Shenstone to fill the vacant seats, and also Mr. A. Lockyer (on vacating the office of Librarian) to fill the seat vacated by Mr. Porter.

Mr. Cole also, as a Member, proposed Mr. F. W. Reader to fill the seat vacant by the death of Mr. Wilson.

This proposal was seconded by Mr. Vaughan.

No other nominations had reached the Secretary, nor any being made at the present meeting, the above-named gentlemen will stand elected at the Annual Meeting.

On behalf of the Council the Secretary nominated the following Members as Officers:—*President*, Mr David Howard, J.P., F.C.S.; *Treasurer*, Mr. W. C. Waller, M.A., F.S.A.; *Secretaries*, Messrs. W. Cole and B. G. Cole; *Librarians*, Mr. W. C. Waller and . . .

No proposal was made of any Member to take the post of Second Librarian. No other nominations having been made, these gentlemen will stand elected as OFFICERS of the Club at the Annual Meeting.

At the close of the meeting most of those present returned to Southend by train and so home

[This meeting had originally been fixed for June 23rd, but was postponed for the reasons stated on a second Circular sent out to the members—the first postponement of a meeting during the life of the Club, a period of over 20 years!]

A VISIT TO THE WITHAM AND TIPTREE HEATH DISTRICTS.

MONDAY, JULY 9TH, 1900.

A whole-day meeting was held with a view to botanical observation and to visit, by special invitation of the proprietors, the celebrated Fruit Farm at Tiptree Heath.

The party met at Witham about half-past ten, the place of rendezvous being the "Spread Eagle" Hotel. To fill up the time before luncheon, some members joined in a ramble through fields and bye-ways, under the direction of Mr. Edwin E. Turner, who kindly acted as botanical leader throughout the day. Others visited the parish church, the principal features of which were pointed out by the Vicar, the Rev. Canon Ingles.

As the meeting was wholly devoted to botany, it may be interesting to give lists of the species of plants observed, which will afford a good idea of the flora of Mid-Essex to be seen on a fine day in July.

During the morning ramble around Witham, the following plants were noted:

<i>Clematis vitalba</i>	<i>Specularia hybrida</i>
<i>Bryonia dioica</i>	<i>Alisma plantago</i>
<i>Euphorbia esula</i>	<i>Cochlearia armoracia</i>
„ <i>exigua</i>	<i>Poa compressa</i>
<i>Reseda lutea</i>	<i>Phalaris arundinacea</i>
<i>Fumaria officinalis</i>	<i>Eranthe phellandrium</i>
<i>Salvia verbenacea</i>	<i>Parietaria officinalis</i>
<i>Allium vineale</i>	<i>Rosa rubiginosa</i>
<i>Galium verum</i>	<i>Silybum marianum</i>
<i>Verbena officinalis</i>	<i>Onopordion acanthium</i>
<i>Lepidium parvijlorum</i>	

The most interesting plant in this list is *Euphorbia esula*. This *Euphorbia* was mentioned doubtfully by Mr. Newbould in Gibson's *Flora of Essex* as "found by Mr. Dale in Essex in Buddle's herbarium is sufficient authority for considering this the 'Rough-fruited Spurge' of Ray's *Synopsis*, p. 312. Smith however thought, though doubtfully, that a state of *E. platyphilla* was the plant meant. This matter is not free from doubt, but the continental distribution of the species renders the occurrence of *E. esula* possible." It is very probable that our old naturalist Dale did actually gather the plant, for Mr. Turner showed us some clumps growing in unmistakable luxuriance. Bentham says that the *E. esula* is not indigenous in Britain, but had established itself on the banks of the Tweed and in a few localities in Southern Scotland. How the plant came into Essex also, is matter deserving enquiry.

Poa compressa growing freely on a wall with the *Parietaria* was a welcome sight to some of our botanists.

At noon all the party returned to the inn where lunch was taken. Here Mr. Turner exhibited fresh specimens of the handsome and rare Purple Cow-wheat (*Melampyrum arvense*) gathered a day or two before in the neighbourhood of Witham.

Brakes were in attendance, and the party started for a five or six miles drive to Tiptree Farm. The route taken was by the Maldon Road skirting Wickham Bishops over Beacon and Totham Hills to Tiptree Fair Green, an exceedingly pleasant drive, affording views of quiet picturesque scenery, quite typical of rural Essex. The weather was fine, not too hot, nor fortunately for our cycling companions (two even rode down from Buckhurst Hill!), were the roads so dusty as had been feared. On the way a stoppage was made at Chancery Wood, where the party spent some time searching for plants, &c. On the way and in the wood, the following plants were gathered:—

<i>Thalictrum flavum</i>	<i>Carex pendula</i>
<i>Hydrocotyle vulgaris</i>	<i>Lotus uliginosus</i>
<i>Hypericum hirsutum</i>	„ <i>corniculatus</i>
„ <i>perforatum</i>	<i>Galium uliginosum</i>
„ <i>fulchrum</i>	<i>Oxalis acetosella</i>
<i>Viola canina</i> (cleistogamous)	<i>Chrysanthemum segetum</i>
<i>Epilobium montanum</i>	<i>Plantago coronopus</i>
<i>Circea lutetiana</i>	<i>Filago germanica</i>

Many of the commoner butterflies were observed, and the great nests or ant-hills of the Wood Ant (*Formica rufa*) which were numerous in the wood, attracted much notice.

Continuing the drive, through a series of very pleasant lanes, the Factory of the Britannia Fruit Preserving Company at Tiptree Heath was reached at about three o'clock, where a kindly and hospitable welcome was extended to everyone by Mr. A. C. Wilkin, the managing director, and where they were also met by Admiral Sir Wm. Luard, the Hon. C. E. Strutt, M.P., Dr. J. H. Salter, and other gentlemen of the neighbourhood. A visit to a jam factory may not seem to have much in common with a botanical ramble, but the members of the Club, and especially the ladies, thoroughly enjoyed their tour round the preserving rooms. Freshly-picked strawberries were at the time being converted into jam, the boiling process, in steam jacketed pans, occupying only about 20 minutes. An addition to the apparatus for boiling

the jam has lately been made in the shape of a vacuum pan, where, after the syrup and fruit have been put in, the air is exhausted during the boiling. This method is said to be the best for preserving the real flavour of the fruit. Every department in the factory, in which there are about 70 or 80 hands employed, was visited under the personal direction of Mr. Wilkin, the party being struck with the cleanliness and order that prevailed everywhere. Then the visitors wended their way to the strawberry fields, in one of which were about 150 pickers—men, women, and children—at work. A great many of these come from the neighbourhood; others are of a nomadic type, who generally manage to find their way to Tiptree by the fruit picking season, and sometimes there are 300 or 400 pickers employed at one time. They are all paid by piece-work, so much per pound, and the children, who are the most expert at the work, can earn as much as 6s. or 7s. a-day. The members of the party were kindly permitted to pick among the strawberries, and availed themselves gladly of the opportunity of sampling some luscious fruit. One of the features of the farm is the manner in which the fields are irrigated, the water being pumped up from a stream some distance off at the rate of about 3,500 gallons an hour, and dispersed by means of hydrants and stand-pipes. There are at present 78 acres of strawberries, 27 of raspberries, 20 of black currants, 12 of red currants, 10 of gooseberries, and a few acres of such fruits as cherries, damsons, &c. In the busiest part of the season about 40 to 50 tons of fruit are picked in a week, and converted into jam or preserved in other ways.

At the end of a most interesting tour of inspection, the conductors led the way to Mr. Wilkin's residence, the homestead of the farm, where on the lawn a large marquee had been erected, and Mrs. Wilkin, her daughters and sons, presided over a sumptuous tea, the staple at Tiptree, "strawberries and cream," of course occupying a very prominent place among the good things provided by our thoughtful host and hostess.

Mr. W. Cole, just before the close of the repast, on behalf of the Club, asked the party to accord to Mr. Wilkin and his family a hearty vote of thanks for his kindly welcome and hospitality. This was seconded by the Hon. Charles Strutt, M.P., and carried by acclamation.

Mr. Wilkin replied, and expressed his pleasure, and that of his colleagues of the Company, at the visit of the Essex Field Club.

Prior to departing from the parish of Tiptree, what remains now of the real Heath was diligently explored. It is really very well worth the trouble, and in a very short time specimens of the following species were to be found in the baskets and vascula of the plant-hunters:—

<i>Erica tetralix</i> , with white variety	<i>Senecio jacobæa</i>
„ <i>cinerea</i>	„ <i>sylvaticus</i>
<i>Galium saxatile</i>	<i>Salix repens</i>
„ <i>mollugo</i>	<i>Hieracium boreale</i> (?)
<i>Polygala vulgaris</i>	<i>Potentilla tormentilla</i>
<i>Orchis maculata</i>	<i>Stachys betonica</i>
<i>Achillea ptarmica</i> , with galls of	<i>Teucrium scorodonia</i>
<i>Hormomyia ptarmicæ</i> (see E. N., i., 177.)	
<i>Nardus stricta</i>	<i>Trifolium filiforme</i>
<i>Montia fontana</i>	<i>Thymus serpyllum</i>
<i>Veronica scutellata</i>	<i>Ranunculus flammula</i>

And then, packing away the numerous specimens obtained during the afternoon, the members of the party climbed into the drags, and a pleasant drive of several miles by way of Braxted and Rivenhall, in the gathering dusk of a beautiful summer evening, brought them to Witham station, and an enjoyable excursion to a close.

Our thanks are due to Mr. E. E. Turner, not only for acting as "Botanical Conductor," but also for revising the lists of plants, and for specimens of several of them for the Club's Herbarium.

TWO MORE EPPING FOREST RUBI.

By J. T. POWELL.

Some years ago, when studying the Rubi of Epping Forest, I collected two or three forms which I was unable to name. I fortunately preserved the specimens, and recently submitted them to the critical judgment of the Rev. W. Moyle Rogers, F.L.S. One turns out to be a very interesting variety of *R. pallidus*, W. & N., which, after being referred to *R. loehri*, Wirtg, by Dr. Focke, the chief continental authority on the genus, has been found to be identical with a Schleswig plant, for which Friderichsen suggested the name *leptopetalus*, without describing it. In Mr. Roger's *Handbook of the British Rubi* it is described as a *var. nov.* under Friderichsen's name. Its full name is, therefore, **R. pallidus** W. & N. (*non Bab.*) *var. leptopetalus*, Rogers. My specimen was collected by the left of the Epping Road, beyond Buckhurst Hill, in August, 1888. Another specimen, which has stood over nearly as long, has been determined as **R. argentatus**, P. J. Muell. This is decidedly a rare bramble in the Forest, though fairly common in many parts of Britain. I found it between the Roebuck and Warren Hill, and believe I have seen it at High Beach.

The bramble recorded in the *ESSEX NATURALIST*, Vol. vi. (1892), p. 80, as *R. hystrix* var., was described in the *Journal of Botany* for 1894, p. 47, under the name *R. powellii*, *nov. sp.*, or *nov. var.* In the new *Handbook*, Mr. Rogers places it under the same name as a subspecies of *R. rosaceus*. It has grown quite true to type in my Cambridge garden from Essex seed. In addition to its forest habitat it has been found on Shooter's Hill, by Major Woolley Dod, R.A., and in Oxfordshire by Mr. G. C. Druce, F.L.S.

[Mr. Powell's previous papers on the Forest Rubi will be found in *E.N.*, Vol. iii. (1889) p. 20; (Vol. v. 1890), p. 189, and Vol. vi. (1892), page 80. Ed.]

FURTHER ADDITIONS TO EPPING FOREST.

In the present volume of the *ESSEX NATURALIST* (*ante* pp. 78-83) we recorded the acquisition of a large portion of Yardley Hill as a part of the public lands of the Forest. On reference to the plan printed on page 81, or better still by an inspection of the spot, it will be seen that the new lands so generously given by Mr. Buxton are only indirectly connected with Bury Wood by Davis's Lane and a somewhat narrow strip (printed black on the plan) with the main portions of Yardley Hill. There is a piece of land on the eastern side of this strip (through which a right-of-way exists) which would clearly be a most desirable property to acquire, as it would bring the north-western corner of Bury Wood into direct communication with the new land, and in itself, forming as it does the eastern slope of the hill, it would be a picturesque addition to the forest. It is therefore with great satisfaction that we record the accomplishment of this improvement.

In a special report of the Epping Forest Committee dated 18th July, 1900, and since received and adopted by the Common Council, a scheme for the acquisition of this portion of land is thus announced :—

"We . . . have the honour to report that at the time Mr. Edward North Buxton presented the Yardley Hill Estate to the Corporation, as Conservators of the Forest, we were very much impressed with the fact that a piece of land containing 13 acres, 1 rood, and 1 perch, situate between Hawkwood and Gillwell Lane, and adjoining the land which formed Mr. Buxton's gift, would be a most valuable addition to the Forest, and we accordingly entered into negotiations with Mr. Melles, the owner, with a view to its purchase, and with the object of ascertaining the value he placed upon it. After some correspondence he expressed his willingness to sell the same at the price of £120 per acre."

"Mr. Melles is the owner of about 500 acres of land in the hamlet of Sewardstone, intersected in many places by green lanes and strips of Forest land, which would prevent the full development of his estate, unless way-leaves and other accommodations were granted to him; he having at the present time only agricultural rights of way and ways of necessity to his property.

Although we considered the proposed addition to the Forest very desirable, we do not feel justified, having regard to the present condition of the City of London Grain Duty Fund, in recommending your Honourable Court to purchase the piece of land: we therefore asked Mr. Melles to supply a list of the way-leaves and accommodation he desired, and which he considered would be an equivalent for the 13 acres. Subsequently, we received from his Surveyor a plan and schedule giving that information. We spent very considerable time in viewing the various sites, and came to the conclusion that the concessions then suggested would be far more valuable than the 13

acres of land. We then obtained the expert assistance of Mr. A. R. Stenning, Surveyor, who confirmed our opinion, not only as to the value of the concession, but as to the undesirability of interfering with the natural beauties and forestal condition of some of these Forest wastes.

“A meeting has since taken place between the Surveyors on both sides, and they have agreed upon a modified proposal which, we think, in the interests of the public will be desirable.”

The report then sets out the amended proposals, which in brief consists in giving Mr. Melles various small roadways across strips of the waste of the Forest, and powers to widen certain forest roads so as to conform to the bye-laws of the Local Authority. The alterations are about 12 or 14 in number and so far as one may judge from the coloured plan attached to the Report, none of them will seriously affect the Forest. The Committee conclude by saying :—

“We are of opinion that the way-leaves and accesses proposed to be given up would be of very little detriment to the Forest, although of value to Mr. Melles, and on the other hand the acquisition of the 13 acres would be a very desirable object in the public interest, and that the proposed arrangement is an advantageous one, and we therefore beg to recommend the adoption of these proposals by your Honourable Court, and that this Report may be referred back to us to carry into effect.”

In the Report of the Committee for the year 1899, a further acquisition in connection with Yardley Hill was recommended in the following words :—

“We have to report that when Mr. Buxton purchased the Yardley Hill Estate, it included a small farmhouse and about a quarter of an acre of land not forming part of the gift. It is known as Hawksmouth Farm, and is approached from the lane leading from Sewardstone Road past Yardley House, Davis's Lane. Mr. Buxton is willing to sell this house and the land attached thereto to the Conservators for the sum of £350, the amount paid by him for the same.

“It can easily be adapted for a Keeper's Lodge, or, if thought advisable, no doubt it could be let to some person desirous of catering for school children and others visiting the Forest. We are of opinion that it would be a desirable acquisition, and beg to recommend that we should be authorised to purchase the same, and that your Honourable Court will be pleased to place the amount of the purchase-money to the credit of the capital account of the Epping Forest Fund.”

The same report announces the completion of the enlargement, deepening, and ornamentation of a swampy portion of the Forest situate between Whipps Cross Road, Leytonstone, and the Eagle Road, Snaresbrook, and known as the Hollow Pond. The total cost was £1,228 4s. 2d., towards which the Corporation voted £620, the Leyton District Council £300, certain residents in the neighbourhood £131 6s., and the balance was

defrayed by the Epping Forest Committee. The Committee report that "the pond affords enjoyment to a very large number of persons, including both residents and visitors, and its construction has very much improved the appearance of that portion of the Forest."

And finally an interesting improvement in Wanstead Park is described:—

"Wanstead Park is bounded on the east by the River Roding, and we have purchased from the Trustees of the late Earl of Mornington a small piece of land on the opposite bank of the river for the sum of £100, with the object of controlling the flow of water from the river into the ornamental waters whenever they require flushing. A dam has been in existence at that spot for very many years; but, as the land on the opposite bank was about to pass into other hands, we deemed it advisable to purchase this small portion with the object of ensuring the control of the dam."

We think that lovers of the Forest are to be congratulated on the additions and improvements made during the past year.

NOTES—ORIGINAL AND SELECTED.

ZOOLOGY.

The Cuckoo's Changed Tune.— "Rusticus" writes in *To-Day*, of June 21st, as follows:—"An old rhyme about the cuckoo, which has many variations, runs sometimes like this: 'In April he whets his bill; in May he sings all day; in June he changes his tune; in July he prepares to fly; in August go he must.' For a piece of folklore this summary of the bird's life, while he is with us, is remarkably accurate; and in the matter of changing their tune the cuckoos in our neighbourhood might have been keeping their eyes upon the calendar, for it was in the small hours of the morning of June 2nd that they began, as by common consent, to vary the last of a long series of 'Cuck-oo-cuck-oo's' with a concluding 'Cuck-uck-oo' or even 'Cuck-uck-uck.' They were so extraordinarily noisy also on that morning as to render sleep impossible after one untimely awakening; and there was nothing for it but to dress and sally forth, although it still wanted a good hour to sunrise."

I do not gather from the remarks of "Rusticus" from what part of England he writes. But I was staying with my son at Ruyton-xi-Towns, Shropshire, during the last week in April (1900) and noted while there that it appeared to be the ordinary habit of the local cuckoos to conclude a series of "cuck-oo's" with a "cuck-uck-oo." Never having heard this prolongation before, I was much interested in it, and wondered whether it was an individual peculiarity or not, cuckoos being much more often heard than seen, and it being impossible to be sure whether a bird uttering "cuck-uck-oo" near a certain village was identical with another heard a mile or two away, or not. However, the cuckoos seem to change their tune earlier in west Shropshire than in some other parts of England.—T. V. HOLMES, Greenwich.

The Colouring of some Essex Shells.—"At Tendring, Essex, there was a large colony of *Helix aspersa* var. *exalbida* in our garden. The lack of pigment was also very striking among *Helix hortensis*. The bands on these shells were very frequently transparent instead of being dark. A lack of pigment was shared also by many plants, notably sweetbriar, clover, docks, and brambles. Lady Rothchild's head gardener at Ashton Clinton, Bucks, had noticed the same thing there. He attributed it to excess of iron in the soil. The well at Tendring was decidedly impregnated with iron. We noted also that during the great drought of 1896-1897 the markings of the shells of *Helix aspersa* were decidedly deeper in colour, being in some cases almost black. We had also a fine grape-vine in the garden, for which these snails had a special weakness. The peculiarity in their eating of the fruit lay in that they did not attack one berry and finish it, but ate straight across the bunch, so straight in fact that this looked as if it had been cut with a razor. It may be worth while to record a specimen of *Helix nemoralis* with a single black band with an opaque white beside it on a pink ground."--(REV.) E. PERCY BLACKBURN in *Science Gossip* for February, 1900.

BOTANY.

***Silene anglica*, var. *quinquevulnera*, L. (Spotted Catchfly) in Essex.**—Miss Dorothy Barber brought me a specimen of this pretty little plant which she had found at Stanway. I am drying the plant for our County herbarium in the Essex Museum of Natural History. This plant is probably a casual. It is recorded as having been found in Suffolk and in Kent, but I do not recollect that it has been listed for Essex. These casuals are interesting, for sometimes they come to stay.—J. C. SHENSTONE, Colchester.

***Vicia lutea*, L. (Yellow-Vetch) at St. Osyth.**—This rare and very local plant has been found at St. Osyth by the Rev. John Vaughan. It occasionally occurs upon the coast in many maritime counties of Great Britain, but the only previous record for Essex appears to be that of Mr. Fitch in 1892, who also found it under the Martello Tower on the St. Osyth shore. It is possible that this rare plant is an over-looked native, or at any rate an established "casual." See ESSEX NATURALIST, vol. vi, p. 116.—J. C. SHENSTONE, Colchester.

***Setaria viridis*, Beauv. at Witham.**—Mr. Edwin E. Turner, of Coggeshall, wrote on Oct. 2nd: "I send you a specimen of *Setaria viridis*. I found it in a field of maize in Maldon Road, Witham, on September 16th. This grass appears to be rare, although it was once recorded for the County in Gibson's *Flora*, and also in *English Botany*."

MISCELLANEA.

Silting-up of Channels off the Essex Coast.—It is a very general impression among the fishermen and yachtsmen in the Colne estuary that some of the smaller channels between the mud and sand-banks are closing up. Whether this is caused by the wearing away of parts of the coast, and the deposition of the detrital matter in these small channels (as is an undoubted fact on the coast at East Mersea), is a matter which needs investigation. A suggestion, put forward by a correspondent in the *Essex Standard*, that the phenomenon is partly the result of the present method of getting rid of the solid matter of London sewage by throwing it into the sea, is worthy of

consideration. The writer says :— " A matter which sooner or later will have to be seriously considered by various authorities is the gradual filling up of the Spitway Channel, from the East Swin to the Wallet, and the consequent impediment to navigation, especially for steamers and laden vessels. During the summer there were several occasions when the Belle Steamers could not pass through this Spitway Channel, and had to go a long distance out of their regular course, to clear the Gunfleet, passing through the Gateway opposite to Walton-on-Naze, and putting many passengers to much inconvenience. This closing up of the Spitway, which is termed by some seamen 'a growing up,' appears to be connected with the deposits of London's sewage in the sea, which, if proved to be the case, should necessitate an alteration of the system now practised. London sewage is treated by the chemical system, *i.e.*, the crude sewage is admitted into precipitating tanks, in which it is treated with lime and sulphate of iron. The matter in solution under the action of chemicals forms into a solid, which, with suspended matter, settles in the form of sludge. The effluent product flows into the Thames near Barking and Crossness, whilst the sludge, to the amount of more than two millions of tons per year, is conveyed, or supposed to be, to the Barrow Deep, where it is deposited in the sea. No doubt it was thought that all this matter would be taken away into deeper water by tides, but there are other ideas that this is not always the case, and that much of it is drawn by currents into channels, as the Spitway, where, with other substances drawn likewise by currents, it settles. Should it be proved that even but a twentieth part of the deposit is 'currented' to the Spitway, it is easily calculated how long it may be before traffic through is stopped altogether, and the Gunfleet made into a solid bank without any dividing channels from the Buxey to the Gunfleet Head."—We shall be very glad to receive facts and opinions relating to this important question. It seems to be a matter eminently fitted for investigation by the British Association Committee on Coast Erosion, from the influence the diverting of currents may have on the wasting and silting-up of our shores.—ED.

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AN INQUIRY INTO THE CAUSES OF THE DEATH OF BIRCH TREES IN EPPING FOREST AND ELSEWHERE.

By ROBERT PAULSON.

[*Read October 6th, 1900.*]

At the Cryptogamic Meeting of the Essex Field Club held on Saturday, Oct. 28th, 1899, a question was raised respecting the death of several birch trees in different parts of the Forest area, and as the data for a satisfactory explanation were not forthcoming, the following notes have been made with the view of placing a report before the Club.

On first visiting (Nov., 1899) those parts of the Forest where birch trees are abundant, it appeared that only a small percentage of them had died or were diseased, but this was owing to the fact that the observations were made during the late autumn, when it was difficult to determine which trees had really been attacked. In the early summer of this year it became quite evident that the infected area was a wide one, that many trees were diseased, and that by far the worst locality was that in which dead trees were first observed, viz., in the N.W. portion of Lord's Bushes, Buckhurst Hill.

A glance at the map (exhibited at the meeting) which has been marked with a series of red dots to indicate the areas of infection, shows that a great part of the Forest has suffered; indeed, wherever the birches have been examined, there have been found signs of the disease. Trees either dying or dead may be seen at Lord's Bushes, on portion of ground just beyond the Old Toll-house, Buckhurst Hill, in private grounds opposite the Bald Faced Stag, in the Church-yard Buckhurst Hill, at Trap's Hill, Strawberry Hill, High Beach, Wake Arms, Long Running, and at Ambresbury Banks.

During last autumn the older and possibly weaker trees were attacked, while during this summer trees of all ages have developed the disease. The Forest birches are not alone in this respect; trees may be seen around London in various stages of decay, but the Forest area appears to have been one of the first in which the disease showed itself in this destructive form.

During the spring and early summer of this year (1900) no signs of the malady showed itself on Chislehurst Common, Hayes Common or Keston Common, but by the end of August diseased trees might easily be detected by a casual observer. They may now be found in great numbers at Chislehurst, St. Paul's Cray, Hayes, Keston, Lewisham, by the canal between Weybridge and Woking, at Walton-on-Thames, and a few in Kew Gardens. Since the end of July last I have failed to find a perfectly healthy district.

From the appearance of trees in the Forest and elsewhere, it is probable that the disease attacked a few trees last year, but that most destruction has been wrought during the present summer. To all outward appearance the course of the disease is very rapid, for trees apparently healthy were found to be dead, and the smaller branches brittle within a few months. The suddenness of the change was a point mentioned at the meeting of the Club referred to above, and this has been made evident by my periodical visits to the infected areas.

As an example, it may be mentioned that on attempting to photograph a nearly dead tree on 23rd July last, the green leaves of a sapling close by were prominently brought before our notice by their obtrusion in the picture. On returning to the same spot at a later date, the 22nd of August, this young tree was dead like its neighbour, having succumbed to the same disease. This is an extreme case, but still the course is always a rapid one.

The three photographs taken by my friend Mr. G. E. Shaw, give the appearance of the trees at different stages of the disease. No. 1 is a group of birches by the side of Monkham's Lane, Lord's Bushes. The middle tree shows an absence of leaves on the uppermost branches, while the catkins are still there. No. 2 is a tree by the roadside near the Old Toll-house, Buckhurst Hill; there are no leaves or catkins on the upper branches, but just a few on some lower ones, while the lowest branches of all are in full leaf. No. 3 represents a tree on the roadside opposite the entrance to Knighton House. Similar trees may be seen in great numbers in all stages of decay, from those like No. 1, to those completely dead.

For June 10th, 1900, the following entry occurs in my notebook respecting the trees in the N.W. corner of Lord's Bushes. The trees were not consecutive, but were among others occupying an area of about one and a half acres:—

- Tree No. 1. Dead from top downwards about 10 feet.
 " " 2. " " " " " " " " as in photograph No 2.



No. 1. Tree No. 1. Commencement of disease on topmost branches. Monkham's Lane, Lord's Bushes. 23rd June, 1900.

- Tree No. 3. Extreme ends of top branches dead, and from top 2 to 3 feet down.
 " " 7. Dead from top downwards 8 to 10 feet.
 " " 8. " " " " " " a few leaves were on the lowest branches.
 " " 17. Partly dead, very small leaves on top branches.
 " " 21. " " " "
 " " 22. " " " "
 " " 24. " " " "

- Tree No. 25. Catkins on upper part, but no leaves.
 „ „ 28. Catkins and very small leaves on upper branches.
 „ „ 30. Dead from above downwards 10 feet.
 „ „ 36. Catkins, but no leaves.

Those branches without leaves were probably attacked last autumn

The intermediate numbers indicate trees which were totally dead.



Fig. 2. Tree No. 2. Second stage of disease. Near Old Toll House, Buckhurst Hill. 23rd June, 1900.

Thus within an area of one and a half acres, twenty-four were quite dead, and thirteen exhibited various stages of the disease.

At the commencement of this investigation, leave was obtained from Mr. F. F. McKenzie, the Forest Superintendent, to root up a dead tree, and to saw away branches from two

others. Sections, longitudinal and transverse, have been made of the roots, stems, and branches. Between the bark and wood at the base of the stem of the dead specimen, there is a small quantity of felt, formed of the hyphal threads of a Basidiomycete. These threads have developed in a damp atmosphere, and show the characteristic clamp connections so common in that Sub-Class; but the most striking feature of the specimens is the

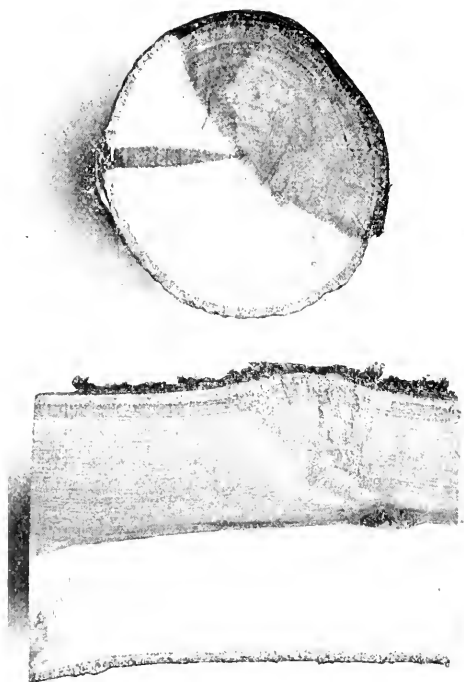


Fig. 3. Tree No. 3 Completely dead. Lord's Bushes. 23rd June, 1900.

almost entire absence of the hyphae of *Agarics* or *Polyperi*. The wood of the branches, as they decay, exhibits a dark brown coloration and where the branch is attacked on one side only, which is often the case, the contrast with the wood on the other side is very marked. See figs. 4 and 5.

The specimen exhibiting a forked branch, Fig. 6, one side of which is badly attacked and the other only slightly so, is a

striking example of this difference of colour. It also shows how far the disease has travelled below the fork. Some of the microscope sections show a dark coloured substance in the cells of the medullary rays and also in the wood ducts. In the bark of the specimens with dark-coloured wood, a micro-fungus is always present : and if the wood is discoloured on one side only, the fungus is always on the discoloured side, while the bark on



Figs. 4 and 5. Sections of a branch showing discoloured, diseased wood and broken bark.

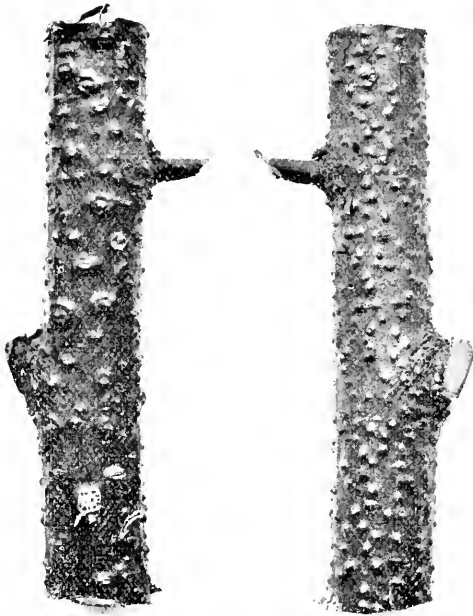
the other side is quite normal. On the branches of all the trees that I have examined, the fungus known as *Melanconis stilbostoma*, Tul., has been found. There appears little on the face of this, for the fungus has long been known to be quite common on dead branches of *Betula alba*. Between the cortex and wood of the



Fig 6. Section of fork showing (a) How the disease travels down a branch;
(b) The smooth bark on the unattacked side.

young branches that exhibit a shrivelled appearance, coarse hyphal threads are abundant. These occur some time before the fungus reaches its perfect form, and before the leaves have withered.

The appearance of a branch depends on the age and development of the fungus (figs. 7 and 8). In an early stage it is covered with an immense number of pustules which show the epiderm tightly extended over the elevations. After a period the pustules burst and disclose a mass of hyphal threads which produce conidio-



Figs. 7 and 8. Two sides of the same branch showing the different stages in the development of the disease.

spores. Later on there is a change of colour, the pustules becoming very dark and even black. Sections of the older ones show another set of spores, the spermatia, long, narrow, hyaline, slightly curved bodies. At the perfect stage of this fungus flask-

shaped perithecia with long necks make their appearance, either in the same or in a separate pustule. Within each perithecium are numerous asci, each containing eight uniseptate ascospores.

Melanconis stilbostoma, being dimorphic, has been named many times. In the conidial form it is *Melanconium bicolor*, Nees., *Melanconium betulinum*, Schm. et Kie., *Melanconium elevatum*, Córdæ, *Didymosporium elevatum*, Lk., *Didymosporium betulinum*, Grev. With spermatia it is *Næmaspora crocea*, Per., *Næmaspora aurea*, Friesio, *Libertella betulina*, Mazerio. With ascospores it is *Sphaeria stilbostoma*, Fr., *Valsa stilbostoma*, Kicks., *Sphaeria pulchella*, Currey. As fungus perfectior, nisi integer, it is *Melanconis stilbostoma*, Tul.

From observations made during the summer, the inference is that *Melanconis stilbostoma* is the cause of the death of so many birches, but as far as I have been able to ascertain, there is no record of this fungus among plant diseases. All the authorities that I have been able to consult state that it attacks dead branches only, especially those of *Betula alba*. Tulasne, however, does go so far as to mention that it is found on branches still moist with sap.

Before the supposition that *Melanconis stilbostoma* is the cause of the disease can carry any weight, it must be demonstrated that the fungus occurs also on the living branches, and for that purpose the selected specimens now exhibited have been chosen. The branch taken from a tree on Strawberry Hill has the pustules more crowded than is usual. They had formed while the cortex was still green, and before the wood showed any signs of decay. There were no leaves on this tree in the early summer. It was possibly first attacked last autumn, but not before the leaf buds and catkins for this year had been properly formed, and although these buds had not expanded, they were still green. Another specimen, with the green leaves still on, shows the fungus in its perfect form. One side only of the branch is covered with the pustules, and the wood of that side alone is brown; it may be noticed that an offshoot from this branch is still covered with green leaves. This case admits of two explanations, either the wood died on one side from some cause not at all evident, and became discoloured, and then the fungus attacked the dead wood; or the fungus attacked one side

of the living branch and gradually killed and discoloured the wood on that side. The latter seems to be the true explanation. When the specimen was taken the disease was spreading across the twig, and would in time have cut off all water supply from the small branch. The equally forked branch referred to above points to the same conclusion.

It is evident that for perfect confirmation of this view, some successful inoculation experiments are all that is required. So far it has not been possible to find a perfectly healthy district, so that should the inoculation prove successful the evidence would for that reason be materially weakened. My test cases have produced no marked results as yet, but this no doubt is owing to difficulties that have still to be overcome. In the ordinary course of events it is the top branches that first develop the disease and I have been able to inoculate only the lower branches in districts where the disease is prevalent.

The following extracts support my view:—

Diseases of Plants induced by Cryptogamic Parasites. By Dr. Karl Freiherr von Tubeuf, Eng., Ed. by W. G. Smith, 1897, p. 224.

“*Valsa oxystoma* causes disease and death of branches of *Alnus viridis* in the Alps. The symptoms are withering up of single branches of an otherwise green bush. In the branch attacked a mycelium is developed in the vessels of the wood whereby the water is stopped and the bark dries up. Black lens-shaped stromata arise under the epidermis of the twig and rupture it. Perithecia are produced under the stroma of the bark, and communicate with the exterior by means of long projecting necks. The asci contain eight unicellular spores of a slightly bent rod-like shape. Maturity is reached on the dry dead twigs.”

Diseases of Trees. By Professor R. Hartig. English Ed. 1894. Page 151.

“In Alpine districts a disease is very prevalent on *Alnus viridis*. Numerous stems and branches contract the disease and die. It is chiefly in August that the leafy branches become infected. The withering of the cortex attracts attention to the presence of the disease, and directly afterwards small black tubercles appear on the dead tissue. The stage of the development of the pustules depends upon the length of time since the branch died. Thus, although the presence of the fungus may be detected on branches that are still living, it is met with in its highest form only on such as are perfectly dead. The progress of the disease down the stem is indicated by a sharp line between the diseased wood which is brown and that which is sound. As the disease advances other lateral branches become affected. An exceedingly tough and vigorous mycelium is easily discernable in the moribund wood especially in the vessels.

The lenticular tubercules consist of black pseudo-parenchyma situated beneath the periderm. Owing to their rupturing the periderm at the highest point of their concave surface, a small depressed aperture is formed."

The diagnosis of the disease of the birch is almost precisely that of *Alnus viridis*. In each case leafy branches are infected; the fungus is with difficulty discerned on the living wood; the progress of the diseases is indicated by colour; its highest development is only on the dead wood. *Valsa* and *Melanconis* are very closely allied, as the synonyms quoted above go to prove, and as everyone knows, *Betula* and *Alnus* are of the same natural order.

Granted that *Melanconis stilbostoma* causes the death of the trees, we can account for the rapid spread of the disease in so many districts several miles apart. The conidiospores carried by the wind, are ready to attack any suitable trees with which they may come in contact, and such a disease as this will be most difficult to cope with on account of the great numbers of trees already attacked.

Other causes have been suggested to account for the death of the trees, as drought and overcrowding; but neither of these bear the test of investigation: for instance, isolated trees like the one in the churchyard at Buckhurst Hill have suffered, and those growing by streams and on marshy localities have died in great numbers.

There are many questions that suggest themselves to which no answer is as yet forthcoming. For instance, *Melanconis stilbostoma* has long been known as a saprophyte; has it gradually assumed the habit of a parasite, or was it always a parasite, which has at length become a very formidable tree destroyer? It is possible that its parasitic nature has up to the present been unobserved. We have in *Cladosporium epiphyllum* a fungus widely known as saprophytic, but quite recently it has been shown to be the cause of disease and death of *Pyrus japonica* (G. Masee, *Kew Bulletin*, Jan., 1899). This fungus occurs on the living leaves of *Betula alba*, but the fact is not mentioned in Sarcardo's list of over two hundred species of fungus, known to attack various parts of this tree.

In summarising the chief points in this report I wish to emphasise the following:—

1. That wherever a district near London has been examined, it has been found to be infected, but in no case have the trees suffered so much as at Lord's Bushes.
2. That the disease has shown itself to be much more destructive during this autumn than at any time last year.
3. That *Melanconis stilbostoma* does occur on living branches and causes their death, but like *Valsa oxystoma*, it, as a rule, reaches its perfection on dead branches only.
4. That the course of the disease is very rapid.

I wish to thank Mr. W. Cole, the Hon. Sec. of the Club, for the help he afforded me last autumn, and also Mr. McKenzie, the Forest Superintendent, who so readily gave permission to remove a large dead tree, when he heard of the investigation it was proposed to make.

My thanks are also due to Mr. G. E. Shaw and to Mr. J. H. Pledge for the photographs that illustrate this report.

THE EOCENE FLORA AND FAUNA OF WALTON-NAZE, ESSEX.

By J. P. JOHNSON.

[Read November 24th, 1900.]

In 1887 the Geological Survey published Mr. W. Whitaker's memoir on *The Geology of the Eastern End of Essex*. The only Eocene fossils listed in it are some Chelonians and a Mammal from the London Clay of Harwich. Not a single species is noted from Walton-Naze, and I do not know of any subsequent record.

Many years have passed since I last visited this classical locality, and some of the fossils mentioned below are no longer in my collection, but I remember the specimens and the finding of them so well that I have no hesitation in listing them. They were found on the foreshore between Walton-Naze and Frinton, among the patches of iron-pyrites left behind by the retreating tide, and were evidently washed out of the London Clay cliffs. Those of the specimens that I have been able to find I have handed over to the Essex Field Club's Museum at Stratford. They are indicated by an asterisk.

The London Clay at Walton is the typical stiff bluish-black clay, turning brown where exposed to atmospheric agencies, and containing thick bands of hard argillaceous limestone full of curious vermiform concretions which stand out in relief on weathered blocks.

Plant remains were chiefly represented by twigs and pieces of wood, some of which were riddled with the tubes of a boring mollusc, *Teredo antenautae*. Of determinable vegetable remains I have a very fine cone of *Petrophyllloides richardsoni*. I also found a beautiful cast in pyrites of an acorn, but although it must still be in my collection somewhere, I have not yet been able to lay my hands on it: so minutely had the replacement of the organic structure by the mineral taken place, that I was able to lift it out and replace it in the "cup."

The Hydrozoan *Graphularia wetherelli* occurred in abundance, forming the axis of cylindrical nodules of hardened clay.

The Crinoid *Balanocrinus subasaltiformis* was the commonest of all the fossils, but unfortunately I have not kept any examples. I trust that the next time a member of the Essex Field Club visits the locality, he will remember the Museum.

The small crab *Plagiolophus wetherelli* is represented by a complete carapace. The local barber had a lovely specimen of the Eocene lobster, *Hoploparia gammaroides*, on the outside of a nodule of London Clay, and I myself obtained claws both of this species and of *H. belli*.

The Brachiopoda are represented by a single species, *Terebratulina striatula*.

Of the Mollusca, besides the *Teredo antenautae* already referred to, I obtained an internal cast of another Pelecypod, and one of a Gastropod, but they could not be satisfactorily determined. The Cephalopoda are represented by the genus *Nautilus* of which the local barber had several examples both large and small.

The Selachian (Sharks) remains were mostly in a good state of preservation and so have escaped the fate of the majority. In nomenclature I have followed Mr. A. S. Woodward's "Notes on the Teeth of Sharks and Skates from the English Eocene Formations."¹

¹ *Proc. Geologists' Assoc.*, vol. xvi. (1899).

Otodus obliquus is represented by a very characteristic tooth.

Odontaspis macrota. I have an example of the typical lateral teeth of this species, identical in shape with Fig. 20 in Mr. Woodward's paper above referred to. This is of special interest as he remarks that "it is still uncertain whether this species occurs in the London Clay."

Odontaspis cuspidata was not common.

Odontaspis elegans, as restricted by Mr. Woodward, was by far the most abundant of the shark's teeth. I obtained over sixty during a couple of hours' search one afternoon. This haul, however, was never repeated; I had evidently come across the accumulation of years.

Besides the teeth of *Oxyrhina hastalis** (Ag.), and the dermal spines of *Raia clavata** (L.), which are probably of Pliocene age, the Walton Crag contains a number of other derived Selachian remains which have clearly been washed out of Eocene strata, usually London Clay, as shown by the hardened and phosphatized nodules of that material which often partially encloses them. They are:—

Galeus sp.

**Odontaspis elegans* or *O. cuspidata*

**Odontaspis macrota*

**Myliobatis toliapicus*

The tooth of *Galeus* is unfortunately lost. I remember very well comparing it with the specimen from the London Clay in the British Museum (A. S. Woodward's fig. 28, *op. cit.*) with which it was identical. The specimen of *Odontaspis macrota* is the twin brother of the one recorded above from the London Clay, that is with regard to shape, for it is stained a reddish colour through long contact with its ferruginous matrix. *Myliobatis toliapicus* is represented by numerous pieces of its peculiar dentition.

In conclusion I would point out that the following list might be considerably enlarged by further search in this promising locality.

LIST OF EOCENE FOSSILS FROM WALTON-NAZE.

PISCES.

Galeus Sp.**Otodus obliquus*, Ag.**Odontaspis macrota*, Ag.* ,, *cuspidata*, Ag.* ,, *elegans*, Ag.**Myliobatis toliapicus*, Ag.

CEPHALOPODA.

Nautilus, Sp.

GASTROPODA.

Pisana ?

PELECYPODA.

Teredo antenautae, Sby.

BRACHIOPODA.

Terebratulina striatula, Sby.

CRUSTACEA.

Hoploparia gammaroides, McCoy.,, *belli*, McCoy.**Plagiolophus wetherelli*, Bell.

HYDROZOA.

Graphularia wetherelli, E. and H.

CRINOIDEA.

Balanocrinus subasaltiformis, Sby.

PLANTAE.

Quercus, Sp.**Petrophylloides richardsoni*.

NOTES ON THE MOLLUSC *PALUDESTRINA* *JENKINSI*, Smith, IN ESSEX AND ELSE- WHERE.

By A. S. KENNARD, *Member of the Malacological Society*, and B. B. WOODWARD, F.L.S., &c.

[Read December 8th, 1900.]

When in 1889¹ Mr. E. A. Smith described the above species as new to science, considerable interest was aroused by it. That a species should exist in such numbers close to London and yet be unrecorded was indeed remarkable.² To have been the first to notice it was at once claimed by more than one person, whilst others declared it to be only a variety of *P. ventrosa* (Mont.), and a third opinion was hazarded that it was a foreign species which had been recently introduced.

In 1892³ one of us described and figured the radula of *P. jenkinsi* and showed its specific distinctness from *P. ventrosa*.

Mr. A. J. Jenkins, after whom the shell is named, informs us that he first noticed the species at East Greenwich in 1883, but, as we shall see later, it was found in the Thames marshes at least twenty-five years before.

In 1886 Mr. G. Sherriff Tye had examples sent to him by the late Miss E. R. Fairbrass from between Deal and Sandwich, perhaps from the same locality whence Mr. L. E. Adams obtained his examples in 1891. It has since been found abundantly in England at Topsham, Lewes, Short Heath (near Dudley), near Middlesbrough and Droylsden (Lancashire). Mr. L. E. Adams has obtained a single dead example at Hythe and Mr. C. Oldham informs me that he has recently found it in abundance in the Trent and Mersey Canal near Sandbach (Cheshire), and a few immature examples in the Shropshire Union Canal, near Beeston Castle. In Ireland, through the researches of Mr. R. Welch, of Belfast, it has been

¹ "Notes on British *Hydrobia* with description of a supposed new species." *Journal of Conchology*, vol. vi. (1889), pp. 142-5.

² Another new and closely allied form has just been found at Dukinfield, Lancashire, and described by Mr. E. A. Smith under the name of *Paludestrina taylori* in the *Ann. and Mag. Nat. Hist.*, ser. vii., vol. vii., p. 191. Both forms have their nearest allies in Tasmanian species.

³ B. B. WOODWARD. "On the Radula of *Paludestrina jenkinsi*, Smith, and that of *P. ventrosa*, Mont." *Annals and Magazine of Natural History*, Ser. vi., vol. ix. (1892), pp. 376-8.

shown to be a widely distributed form, occurring at Port Stewart (Co. Derry), St. Johnstone and Carrigans (Co. Donegal), Culmore (Co. Derry), Kenmare (Co. Kerry), Newry (Co. Down) and Antrim at the mouth of the Sixmilewater.

The opinion has been expressed that the species is identical with the West Indian *P. crystallina* Pfr. Certain it is that the non-carinated examples of these species are very near to each other, but in the carinate specimens the carinæ in *P. jenkinsi* are by no means so pronounced as in *P. crystallina*. In the latter species they may rather be described as a series of spines which thus contrast with the tufts of the former. In addition, the Rev. Prof. H. M.

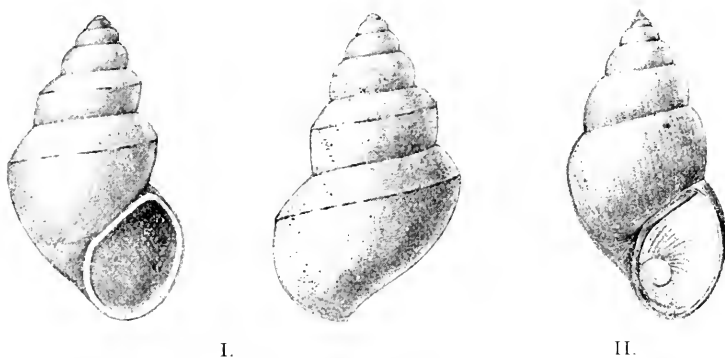


Fig. I. *Paludestrina jenkinsi*, Smith, typical form $\times 10$.
 .. II. smooth form $\times 10$.

Gwatkin informs us that the radulæ differ. He writes:—"In the central tooth *P. crystallina* has a narrower form, a more decided anterior concave sweep, and more conspicuous basal teeth nearer to the posterior edge. But the central denticle is less developed than in *P. jenkinsi*. So far the specific distinction is clear. My doubt is that I have a strong impression that one or the other is very variable." From these facts we venture to think that *P. jenkinsi* is a good species. It has been figured three times:—by A. J. Jenkins in *Science Gossip* (1890), vol. xxvi., pp. 104-105; by Walter Crouch in *ESSEX NATURALIST* (1890), vol. iv., p. 213; and by L. E. Adams in *The Collector's Manual of British Land and Freshwater Shells* (2nd Edition). Its habits have been well described by Mr. Jenkins as well as its distribution (*op. cit.*, and *ESSEX NATURALIST* (1891), vol. v., p. 232). Two

varieties have been described. In 1890 Mr. Jenkins, with Mr. Smith's sanction, considered the carinated form to be the type and named the uncarinated form var. *ecarinata*. In 1891 he described var. *tumida* (*Science Gossip*, vol. xxvii., p. 9), and in the same year he proposed a var. *gracilis*, which, however, is fortunately still undescribed. The shell is a very variable one, the non-carinated examples passing into the carinate and the tumid form into the tall slender one, so that these names are of no use. Mr. L. E. Adams has considered the smooth form as the type and has recorded a var. *carinata*, Smith, but this is an obvious error (*op. cit.*, pp. 144-5).

In spite of the fact that this species has not been found outside the British Islands, it has been suggested that it is an introduction, and Mr. L. E. Adams has enunciated the theory that it has come from Finland with timber. As we have already shown it is a widely distributed form in these Islands, and discontinuous distribution is in itself almost sufficient to prove that it is an ancient inhabitant. In 1897 our friend Dr. Frank Corner sent us a small box of shells which he had obtained from a section exposed in enlarging one of the "fleets" in the Roding Valley, near Barking. The shells occurred in patches under two to three feet of "marsh clay." There were about a dozen examples of *Paludestrina jenkinsi* associated with *Bythinia tentaculata* (Linn), *Limnæa truncatula* (Müll.), *Planorbis marginatus* (Drap.), and *P. spirorbis* (Linn.). These shells still retained their periostracum, a characteristic of many of the shells from the Alluvium. It is, of course impossible to pronounce definitely on the age of these shells, but they are of considerable antiquity though within the historic period. Thus there can be no doubt that *Paludestrina jenkinsi* has lived in the Thames Estuary for a very considerable time.

In 1859 the late Mr. G. B. Sowerby figured, but did not describe, a shell under the name of *Rissoa castanea*, Jeffreys, examples of which had been taken by Mr. Pickering in a ditch about two miles below Gravesend.⁴ Dr. J. Gwyn Jeffreys, in referring to these examples, states that they were considered by Forbes and Hanley, though with some doubt, to be a variety of *Hydrobia ventrosa*, but, in his opinion, since they so greatly resembled a species of *Hydrobia* from the Cape of Good Hope, he could not

⁴ *Illustrated Index of British Shells*, pl. xiv., fig. 11.

include them in the English molluscan fauna and noted that all attempts to obtain additional examples had failed.⁵ Since the figure of *Rissoa castanea* somewhat resembled *Paludestrina jenkinsi* there seemed a probability that the former might be represented in the Jeffreys' collection now at Washington, U.S.A. Examples of the latter were accordingly forwarded to Dr. W. H. Dall, who most kindly replied that there were no examples of *Rissoa castanea*, Jeffreys, in that collection, but there were two examples, agreeing in every respect with the specimens of *Paludestrina jenkinsi* forwarded, which were labelled:—"Hydrobia ferrusina, Hampshire, Sowerby." There can be no doubt that these are the shells which Jeffreys states had been sent to him some years ago by the late G. B. Sowerby from that county.⁶ We have thus conclusive proof that *Paludestrina jenkinsi* had been examined by Dr. Jeffreys and misidentified.

When we noted this in the *Proc. Malac. Soc., Lond.*, vol. iii., p. 299, Canon R. M. Norman informed us that he had in his possession four examples given to him by Mr. Pickering as *Rissoa castanea*, and most kindly forwarded the specimens for our inspection. Of these, two were slender examples of *Paludestrina ventrosa* and two *P. jenkinsi*. Additional proof is thus furnished that the shell has been both overlooked and mis-identified.

THE ESSEX FIELD CLUB.

PRACTICAL DREDGING AND TRAWLING EXCURSIONS.

FRIDAY AND SATURDAY, JULY 20TH AND 21ST, 1900.

For some time past it has been recognised that if any real and rapid advance is desired in the knowledge of the Fauna of our Essex coast line, systematic attempts must be made to collect, determine and register the species occurring. And now that the Club has a permanent County Museum, such work is still more desirable, in order to stock the Museum with an authentic series of specimens.

The Council therefore authorised the Curator to make a beginning in this work, and the Colne Estuary and outlying waters was chosen as the scene of the first attempts. Arrangements were made, by the kindness of Messrs. Forrest and Son, for the hire of a small steamer, with dredger-man and tackle, so that operations may be carried on at some distance from the shore (the Wallet and like waters).

⁵ *British Conchology*, vol. i., pp. 68-9.

⁶ *Ibid.* p. 69.

It was believed that many members and friends would desire to join in the Excursions, which it was foreseen would prove very pleasant and instructive even to those not specially interested in Marine Zoology. Unfortunately the first excursions of the series, although very carefully planned, were poorly attended, perhaps owing to several adverse circumstances. In the first place the excursions had been originally fixed for June 29th and 30th, but in consequence of the stormy weather prevailing at that time, they were postponed. The annual exodus of our members from home appeared to have taken place earlier than usual, and the Secretaries experienced much disappointment from this cause. Howbeit the weather proved to be fine, the sea rather rough on the first day, but on the second all that could be desired, and in almost everything but the attendance the experiment was successful.

As the work had a definite object, and the accommodation deemed limited (in anticipation of a numerous company) some rules were laid down for shipping the "crew." No catering on board was undertaken, but a tariff had been arranged at two hotels at Brightlingsea. All arrangements were "wind and weather permitting" and no responsibility on this score could be admitted by the conductors. As the main purpose of these excursions is the collecting of specimens, the rules stated that all objects obtained would be the property of the Club. Duplicates would, however, be distributed to students and others. As it is intended to arrange similar excursions in the future, it may be as well to mention these details.

The steamer "Wyvern" started each day from Brightlingsea at about 11 o'clock. On board besides the sailors, was an expert dredgerman specially engaged, with dredging and trawling tackle, and an ample supply of bottles, dishes, and tubes, and preservative fluids for the conservation of specimens. In the absence of any person more highly qualified, Mr. W. Cole, F.L.S., acted as Zoological "Conductor." On both days the "Wyvern" steamed out for a considerable distance, and the working of the trawl and dredge produced an abundance of specimens of the better-known organisms of our coast. To many on board the work was both novel and interesting. But few species actually new to the Conductor (who had frequently dredged over most of the ground on previous occasions) were obtained, and as the nomenclature of these is now being settled by the experts at Plymouth (at Dr. Sorby's request in connection with his papers on the Essex Marine-Fauna to be published in the *ESSEX NATURALIST*) it will be best to postpone a scientific report. Most of the specimens were carefully preserved, and are now in the Essex Museum. The great value of formalin was again demonstrated, and the specimens of "Medusa" preserved are wonderfully transparent and life-like.

The expenses of the excursions were necessarily somewhat high, and were not met, as had been hoped, by a commensurate sale of tickets. But there is no intention of relinquishing this interesting experiment, although some changes in the business methods, and choice of vessel, &c., must be made in the future to guard the Club against too great a loss.

To those members who were too timid or undecided to take part in the excursions, we can only say that they lost one of the most pleasant and instructive meetings of the season!

THE ANNUAL CRYPTOGAMIC MEETING AND
196TH ORDINARY MEETING.

SATURDAY, OCTOBER 6TH, 1900.

The "Fungus Foray" was held on this day in Epping Forest and was very numerously attended. The meeting was an all-day one, and the Headquarters were established at the "Kings Oak" Hotel, High Beach.

The Referees for Botany were Dr. M. C. Cooke, Mr. George Masee, F.L.S., and Mr. R. Paulson. The arrangements were quite as usual at these annual assemblies. A large well-lighted room at the Hotel with abundance of table-space was reserved for the exhibition of specimens, and as a meeting-place all day. The only innovation was one intended to give employment for non-botanical attendants at the meeting. It was suggested that some attention should be paid to the species of SPIDERS occurring in the woods, and Mr. F. O. Pickard-Cambridge and Mr. Frank P. Smith (author of the excellent papers on the group now appearing in *Science Gossip*), kindly promised their valuable aid. It was hoped that some members might be induced to take up this very promising field of study. The only paper hitherto published by the Club, is that in Vol. IV. of the *Transactions* (pp. 41-49), "A Contribution to the Knowledge of the Arachnida of Epping Forest," by the Rev. O. Pickard-Cambridge, M.A., F.L.S. A supply of small bottles and tubes, with spirits, &c., was provided in the meeting room, and several persons, including Mr. W. M. Webb, Mr. W. Cole, Mr. Hildyard, with Mr. Pickard-Cambridge and Mr. Smith, worked hard during the day to procure specimens, not without success as the Report in the present part on the Spiders observed will show.

The first party reached Loughton Station at 12 o'clock, and others arrived throughout the afternoon, making their way to the woods in Honey Lane Quarters and to Monk Woods, &c. Several members of the Selbourne Society honoured us by attending the Meeting.

Fungi were not very numerous in individuals, but as Mr. Masee's report indicates, the gatherings, especially among the smaller species, were unusually interesting. Some of the hunters were delighted to find the pretty "Birds-nest Fungus" (*Cyathus vernicosus*) very commonly on twigs among the fallen leaves in the woods in Honey Lane Quarters.

At about six o'clock the party which had then greatly increased in numbers, sat down to tea, the President, Mr. David Howard in the chair. Among those present were Prof. Sylvanus Thompson, F.R.S., Mr. Horace T. Brown, F.R.S., and Prof. Meldola, F.R.S., and Mr. John Spiller, F.C.S.

After tea, the party moved into the exhibition room, and the ORDINARY MEETING (196TH) was held, the President in the chair.

The following were elected members of the Club:—Rev. A. F. Hunt, M.A., and Mr. Tyndale White, J.P.

The Secretary announced that the Essex Museum of Natural History at Stratford would be opened by the Countess of Warwick on Thursday, October 18th, and that the winter evening meetings of the Club would be resumed at the Technical Institute, adjoining the Museum, on Saturday, October 27th.

Mr. Massee made a verbal report on the more interesting species of Fungi observed during the day ; this is embodied in the list by him, printed in the present part of the ESSEX NATURALIST.

Dr. M. C. Cooke made one of his characteristic speeches, referring to the early days of Fungus hunting and study, and to his own work during the last 50 years. He gave many interesting reminiscences of the origin of Cryptogamic research in Great Britain, and contrasted the many aids to the beginner now available with the utter dearth of books and experts in the study in his young days.

Mr. Robert Paulson read his Preliminary Report on the cause of the death of Birch trees in the forest and in many other places. This Report is printed in the present part of our Journal (pp. 273-84). The author illustrated his remarks by the exhibition of numerous photographs and specimens of the infected branches of birch most carefully prepared and sectioned.

A discussion was carried on by the President, Mr. Massee, Mr. Elliott, and the author, and Mr. Paulson was cordially thanked for his communication.

Mr. F. P. Smith made some observations on the mode of occurrence of Spiders, and the methods to be employed in their collection and preservation.

Mr. F. O. Pickard-Cambridge also spoke on the same subject. He reported that a considerable number of species of spiders had been captured in the woods that day, many being new to the Forest list. He exhibited some very beautiful drawings of British Spiders made by himself, and gave some useful hints on the study. He hoped that more attention would now be paid to the group by members and friends of the Club, now that a beginning had been made in collecting the spiders of the Forest.

Mr. Pickard-Cambridge also alluded to the forthcoming production of the volumes of the *Victorian History of the Counties of England*. He himself had undertaken the enumeration and description of the Arachnida of Essex, and he asked for help in making the records more complete.

Mr. F. P. Smith and Mr. Pickard-Cambridge subsequently furnished the Editor with lists of the species observed. These have been combined by Mr. Cambridge in the Report printed in the present part of the ESSEX NATURALIST.

Mr. W. Mark Webb, F.L.S., exhibited and presented to the Museum a series of Holocene Mollusca from Shalford, Essex. The collection is referred to in the paper on the "Post-Pliocene Non-Marine Mollusca of Essex" by Messrs. Kennard and Woodward in the Xth Volume of the ESSEX NATURALIST, page 95. Mr. Webb's donation was rendered the more acceptable by the careful way in which the specimens had been mounted in glass-top boxes.

Prof. Silvanus Thompson, F.R.S., made some observations on the diffraction spectra exhibited by the dissepiment of the seed pods of the well-known garden plant called "Honesty" (*Lunaria*) and similar phenomena exhibited by the suriaces of some natural minerals, &c

Mr. John Spiller, F.C.S., also spoke on the same subject.

The President called attention to the interesting fact that on the 10th of January next the Club would attain its majority, having been founded on that day in 1880, and he hoped that the occasion would be marked in some special way, at any rate during the coming year.

The remainder of the evening was occupied in examining the numerous specimens displayed on the tables in the room.

OPENING OF THE ESSEX MUSEUM OF NATURAL HISTORY.

THURSDAY, OCTOBER 18TH, 1900.

On this afternoon the opening ceremony took place. A full report appears as a separate article in the present part.

THE 197TH ORDINARY MEETING.

SATURDAY, OCTOBER 27TH, 1900.

This meeting was held in the Physical Lecture Theatre of the Municipal Technical Institute, Romford Road, Stratford, Essex, at half-past six o'clock, Mr. William Whitaker, F.R.S., F.G.S., in the chair.

[This was the resumption of the meetings in the Institute after the disastrous fire on October 23rd, 1899. The Council and Officers have pleasure in acknowledging the continued kindness in this connection of the Technical Instruction Committee of the Borough of West Ham, and of the Principal of the Institute, Mr. A. E. Briscoe, B.Sc. The great value and convenience of such a well-appointed assembly-place in immediate connection with the Museum and Library was acknowledged by all present. The Headquarters and Library were open during the afternoon and evening after many years interval, since their removal from the old quarters at Buckhurst Hill.]

Mr. F. C. Clarke was elected a member of the Club.

Mr. D. J. Scourfield, F.R.M.S., exhibited an extraordinary mass of the Statoblasts of *Cristatella* from a pond in Epping Forest. He also displayed one of the statoblasts under the microscope. Mr. Scourfield said that although the statoblasts of *Cristatella* were fairly common in the forest pools, it was rarely that a mass such as that shown was found.

Mr. Oldham exhibited a curious sport of the garden *Scabius*, in which the corollas of all the compound flowers had reverted to green leaves.

Mr. J. P. Johnson brought up specimens of the teeth, &c., of some of the small vertebrate animals and associated Palæolithic "flakes" from the pits at Grays Thurrock, mentioned in the paper subsequently read by Messrs. Hinton and Kennard.

Mr. Martin A. C. Hinton exhibited Palæolithic implements from the High Terrace Drift at Milton Street, Swanscombe, Kent, and from similar deposits at Grays Thurrock and Wanstead, Essex.

Mr. W. H. Dalton, F.G.S., remarked upon some of the Vertebrate fossils from Walton-Naze and elsewhere, which would ultimately be shown in the geological series in the Club's Museum.

The following paper was read by the authors, Messrs. Martin A. C. Hinton and A. S. Kennard:—

"Contributions to the Pleistocene Geology of the Thames Valley. I. The Grays Thurrock Area, Pt. 1."

The paper was illustrated by drawings of the sections and by specimens.

Considerable discussion on some points in the paper was carried on by the Chairman (Mr. Whitaker), Mr. Johnson, and the Authors, and a cordial vote of thanks was passed to Messrs. Hinton and Kennard for the paper, which will appear in the *ESSEX NATURALIST*.

Tea was served in the Refreshment Room of the Institute at the close of the meeting. Many members took advantage of the opportunity of the meeting to inspect the Museum, which had been open every day (excepting Wednesday mornings) since Monday, October 20th.

THE TWENTIETH ANNUAL GENERAL MEETING AND 198TH ORDINARY MEETING.

SATURDAY, NOVEMBER 24TH, 1900.

The 20th Annual Meeting (which was postponed at the Special Meeting on March 31st, for reasons then given) was held at 5.30 p.m. in the Physical Lecture Theatre of the Municipal Technical Institute, Stratford, Mr. David Howard, President, in the chair.

The minutes of the 19th Annual Meeting held on March 25th, 1899, and printed in the *ESSEX NATURALIST*, vol. xi., pp. 29-30, were read and confirmed.

The Treasurer, Mr. W. C. Waller, read the summary of the Treasurer's Statement of Accounts for 1899, duly signed by the Auditors, Messrs. Walter Crouch and J. D. Cooper.

The Report of the Council for the year 1899 was read by the Secretary. He said that a certain awkwardness attached to the Report, inasmuch as it related only to the year 1899, and so much had happened with respect to the museums, &c., during the current year. These last matters would, of course, be reported upon at the next Annual Meeting in March, 1901.

The Statement of Accounts and the Report were received and adopted. They are printed in the present part of the *ESSEX NATURALIST*.

At the Meeting on June 23rd last, the following were nominated to fill vacancies on the Council :—Messrs. Andrew Johnson, J.P., A. Lockyer, F. W. Reader, J. C. Shenstone, F.L.S., John Spiller, F.C.S., and F. H. Varley, F.R.A.S.

It was announced that the Rev. A. F. Russell wished to resign his seat on the Council, in consequence of inability to attend the evening meetings, although he would retain his Chairmanship of the Epping Forest Museum Committee.

Mr. Hugh McLachlan, A.R.I.B.A., was nominated by the Council in the place of Mr. Russell.

The death of Mr. E. Durrant occasioned a vacancy on the Council, but no nomination was made of any member to fill his place.

As Officers for 1900, the following were nominated :—

President, Mr. David Howard, J.P., F.C.S., F.I.C. ; *Treasurer*, Mr. W. C. Waller, M.A., F.S.A. ; *Hon. Secretary and Curator*, Mr. W. Cole, F.L.S., F.E.S. ; *Assistant Hon. Secretary*, Mr. B. G. Cole ; *Librarians*, Mr. W. C. Waller, M.A., F.S.A., and *Hon. Counsel*, Mr. W. C. Dare, B.A., Barrister-at-Law ; *Hon. Solicitor*, Mr. H. I. Coburn ; *Auditor for Council*, Mr. Walter Crouch, F.Z.S. ; *for Members*, Mr. J. D. Cooper.

No other Members having been proposed, the above gentlemen stood elected by Rule VII. as Members of the Council and Officers for the year 1900, and were so declared by the Chairman.

Prof. R. Meldola proposed that Mr. Passmore Edwards be elected one of the HONORARY MEMBERS of the Club, as a slight recognition by the members of his great services to the Club and to the cause of the study and popularisation of natural history in the county by so generously contributing to the building and fitting up of the Museum at Stratford. The only honour the Club could confer was to enroll him in the list of members, and Prof. Meldola said that he was sure such a step would be welcomed by all as an expression of their gratitude and admiration for Mr. Edwards' public spirit and enlightened munificence.

Mr. Walter Crouch had much pleasure in seconding the proposal.

The President warmly supported the motion. He looked upon Mr. Edwards as one of the most remarkable men of the day in his desire to promote the intellectual, physical, and moral progress of the people in the establishment of the many hospitals and "homes," public libraries, picture galleries, and museums, which we owe to his support and initiation. The motion was carried by acclamation.

Mr. Howard then gave a short speech in lieu of an Annual Address, devoting himself to the consideration of some of the recent researches as to the influence of Mosquitoes in spreading the virus of malaria. He referred to the important paper on Malaria and Mosquitoes in the current part of the *Quarterly Review*, and in commending the subject to the attention of the members, said that he had a personal interest in the question inasmuch as one of his own sons had taken part in the investigations.

Prof. Meldola said that the Club was greatly indebted to Mr. Howard for his able assistance during so many years and for his regular attendance at the Council meetings during the critical period of the Club's life. The subject of their President's remarks that evening was an excellent example of the usefulness of studies often ignorantly termed "useless knowledge." What promises to be a most important agency in the control of a scourge very seriously affecting the nation's imperial interests, is a direct outcome of the "trivial" studies of entomologists and microscopists of the life-histories of such despised little creatures as gnats and midges.

Prof. Meldola also expressed the gratitude of the Club to Mr. W. C. Waller for his services as Treasurer and Librarian, and to the other officers of the Club.

Special allusion was also made to the valuable work of the Auditors, Mr. Walter Crouch and Mr. J. D. Cooper.

The President thanked Prof. Meldola and the members for their appreciation of his services, and Mr. W. C. Waller returned thanks for the officers.

The company then adjourned to the Tea Room, and at seven o'clock the 19TH ORDINARY MEETING was held, the President in the chair, and afterwards Prof. Meldola, V.P.

The following were elected members of the Club:—Mr. Archie E. Barnard, Mr. Fred. J. Brand, and Mr. J. R. Roberts, J.P., E.C.C.

Prof. Meldola exhibited a specimen of *Vanessa antiopa* (the "Camberwell-Beauty Butterfly") caught at Bigods near Dunmow, by Mr. G. Ruffel, one of the boys at the Countess of Warwick's School. Mr. Ruffel stated that he saw another specimen on the same day, but failed to catch it.

Mr. J. P. Johnson exhibited some fossil remains of Sharks, &c., from British Cretaceous and Eocene strata, and also many of the specimens from Walton-Naze referred to in his paper read later in the evening. Mr. Johnson stated that he would have pleasure in depositing the Walton specimens in the Essex Museum of Natural History.

With reference to the first paper on the agenda, entitled "On the variation of the Marine Animals on the coast of Essex during the last ten or twelve years," the Secretary stated that Dr. Sorby desired to hold the paper back for a few months. Dr. Sorby had recently examined his specimens at Sheffield, and found so much to add to the paper, that he thought it best to thoroughly revise it, before reading it before the Club.

Mr. J. P. Johnson read a paper entitled "Notes on the Eocene Flora and Fauna of Walton-Naze, Essex." This paper is printed in the present part of the *ESSEX NATURALIST*.

Prof. Meldola made some remarks on the state of the sections at Walton-Naze many years ago, when he had the opportunity of visiting the spot with Messrs. W. and B. G. Cole in 1880.

A vote of thanks was passed to Mr. Johnson on the proposal of the President.

Mr. J. C. Shenstone, F.L.S., V.P., then gave a most interesting "Lantern Demonstration" of a series of Photographs of British Wild Flowers. The exhibition was designed to illustrate the value of photography in depicting the natural form and "habit" of plants, and, in some instances, the natural surroundings. The slides were nearly 100 in number, all made by Mr. Shenstone himself, and in the vast majority of cases from Essex plants and localities. Mr. Shenstone enlivened his demonstration with many botanical and "folk-lore" particulars of the several species, and the localities and also of the special precautions necessary in taking such photographs in the open.

Prof. Meldola (who had taken the chair, Mr. Howard being obliged to leave before the conclusion of the lecture) praised the skill and perseverance shown by Mr. Shenstone in producing this remarkable series of pictures, and said that it was quite refreshing to see photography applied to such a useful purpose—amateur photographers in general expending their energies in purposeless "snap-shotting" of inappreciated portraits and views. But the absence of colour in such slides led all naturalists to look forward to the advent of some system of "colour-photography." It would add greatly to the interest and value of Herbaria if in addition to the dried specimens photographs of living plants in their habit as they grew and with the natural surroundings could be preserved. And the lecturer had shown them how to do it. He proposed a cordial vote of thanks to Mr. Shenstone for his interesting and helpful demonstration.

Some discussion took place on points in the habits of some of the plants, and the vote of thanks was passed with acclamation, and also one to Mr. King for his skilful management of the electric lantern by which the slides were projected on the screen.

Mr. Shenstone replied, and some announcements of forthcoming arrangements having been made, the meeting ended.

[An innovation was made on this occasion, by way of experiment, the usual TEA having been served in the Refreshment Room of the Institute at six o'clock, instead of after the Meeting as heretofore.]

MEETING IN SUPPORT OF THE RE-ORGANISATION AND EQUIPMENT OF THE EPPING FOREST MUSEUM.

SATURDAY, DECEMBER 8TH, 1900.

In previous papers and reports in the *ESSEX NATURALIST* the position and prospects of the Epping Forest Museum have been fully detailed. In April, 1899, the Epping Forest Committee of the Corporation of London resolved to thoroughly restore the Queen Elizabeth's Lodge, and by removing the partitions dividing the first floor room, which for centuries, probably, had marred its appearance, to give more space, "with the object of extending the Museum," whilst internal and external repairs were carried out to strengthen the structural condition of the building. The Lodge has also been fitted with hot-water apparatus to keep it dry and warm. Towards the cost of this restoration, the Corporation of London contributed £500, and the Essex Field Club has paid £50, being the expense of converting the scullery into a small room to be used for curatorial work. The total cost of these alterations has slightly exceeded £1,000.

The two fine apartments, the "Oak Room" and the "Banqueting Room," with the grand staircase and landings, are now available for exhibition purposes, and this accession of space has necessitated a reconsideration of the whole plan of the Museum. It is the wish of the Epping Forest Committee that no large upright cases should be placed in the middle of the rooms, and that no fittings should cross the main timbers of the walls.

The intention is to fit up the Museum with low floor-cases, and with shallow flat cases for the walls, so constructed as to fit into the intervals between the main timbers, and thus not obscure the structure of the building.

The experience the Club has had in work of this kind proves that at least £300 will be required; to be expended as follows:—cases, frames and fittings, £150; preparation and purchase of specimens, glass-topped boxes, tablets, labels, etc., etc., £100; and contribution of cost of Curator's room, £50.

To raise this sum of £300 the Epping Forest Museum Committee held a public meeting in the Lodge on the above named day, the chair being taken by E. N. Buxton, Esq., *Verderer (Vice-President of the Essex Field Club)*, and several local gentlemen and others interested in the question attended.

The Chairman said he thought that they might congratulate the Essex Field Club and the Secretary, Mr. W. Cole, on the possession for the purposes of the Museum of a much more worthy building than before. The new, or rather the restored, oak-room was an enormous improvement and addition to the Lodge, and he was glad to think that by the new scheme it and the Banqueting Room could be utilized for the Museum without detracting from the antique appearance of the building, and in a manner to avoid over-crowding. That was an object always to be aimed at. The charm of the rooms would in his opinion be spoilt by over-crowding. It was quite clear that they could not have everything that occurred in the district at the Lodge,

but they could have a few representative and educational collections, which would serve to illustrate the natural history of Epping Forest. He called upon the Hon. Secretary to explain the new scheme which was to be considered that afternoon.

Mr. Cole laid before the meeting a printed statement of the plans for the re-arrangement and the estimated cost of carrying out the same. In doing so he called particular attention to the vertebrate classes—birds and animals: whether they should be exhibited at all, and, if so, how they should be exhibited. The wish of the Epping Forest Committee of the Corporation of London, that no large upright cases should be placed in the middle of the rooms, and that no fitting should cross the main timbers of the walls, would necessitate considerable change in the methods of arrangement, and a replacement of some of the old cases by others. And these stipulations would also bar any collections of vertebrates (mammals, birds, fishes) mounted in the ordinary museum way. After full consideration of the matter, and in view of the fact that their Essex Museum of Natural History at Stratford was now easily accessible to all interested in the forest, Mr. Cole submitted that it was not desirable for the Club to have two general collections of vertebrates, and that they should avoid as much as possible any duplication of their work, which meant waste of time, money, and energy. Many of their visitors and members would, however, regret to find birds and beasts unrepresented, and he thought that the plan he now submitted would fairly meet the views of all, and would coincide with the wishes of the Corporation Committee. If the scheme were adopted and sufficient funds were obtained it was proposed to have an exhibition of birds and animals mounted in natural groups in humble imitation of the beautiful cases in the British Museum of Natural History. It was also proposed to show a complete series of the eggs of birds frequenting the Forest and examples of the most curious, pretty, and well-constructed nests. Of the invertebrates, they intended to show complete sets of butterflies, the larger moths, beetles, bees etc. Further there would be a set illustrating the geology of the Forest, and a collection showing the botanical and pictorial characteristics of the Forest trees, as well as works of early man, illustrations of the Forest Camps, and other antiquities. Some of these collections, notably the groups of birds (which must be choice examples of the taxidermist's art) would be very costly, and would involve much care and labour in gathering together and proper preparation, but he thought that the estimate of £300 would enable them to fit up the Museum in a satisfactory manner.

The Secretary read out a list of subscriptions already promised, amounting to nearly £100.

Mr. J. E. Harting, F.L.S., proposed the first resolution in the following terms:—

“That this meeting approves and confirms the scheme of re-organization of the Epping Forest Museum of the Essex Field Club, put forward in the printed statement of the Hon. Curator, dated Dec. 8th, and pledges itself to do all in its power to promote the interests of the Museum on the lines laid down.”

Mr. Harting said that he thought the plans put forward were very satisfactory in the main, but the details would require some little further consideration before they were finally settled. He thought that many groups of birds and animals could be well represented, and he would be happy to give the Curator some hints on this matter. He had been asked why they had two museums so near each other, and he had pointed out that the Forest Museum and the Stratford Museum were quite distinct in plan and the objects they would contain. The one would supplement the other. It would be a great pity if, having got the use of that very appropriate building in which they were assembled and the cordial co-operation of many persons, they did not fit it up worthily and make it of interest to those who rambled about the forest and were interested in its natural history.

The resolution was seconded by Mr. Walter Crouch, and carried unanimously.

Mr. Howard Wall proposed:—

“That a Public Subscription Fund be forthwith opened to raise the minimum sum of £300 required at once by the Council and Committee of the Essex Field Club, to carry out the scheme of re-organization and re-arrangement of the Museum.”

This was seconded by Mr. Matthew Rose, and spoken to by Mr. Henry Cook, J.P., and also carried unanimously.

The Rev. A. F. Russell (as Chairman of the Epping Forest Museum Committee) proposed:—

“That the best thanks of this meeting be given to the Epping Forest Committee of the Corporation of London for their public spirit shown in the restoration and maintenance of Queen Elizabeth’s Hunting Lodge, and for the permission accorded to the Essex Field Club to establish the Epping Forest Museum in the building.”

This was seconded in warm terms by Mr. Hugh McLachlan, and also carried unanimously.

Mr. E. N. Buxton, as Verderer, and Member of the Epping Forest Committee returned thanks for the vote. He said that the public were also much indebted to the Essex Field Club, and its Secretary, for initiating the idea of the Museum, and for pressing forward the scheme for restoring the Lodge. He was of opinion that this work would not have been taken in hand without such initiation and support. He was himself much interested in the idea of the Museum, but he was also interested in the Lodge as an ancient building, and consequently was most desirous that the fittings put into the Museum should be such as not to mar the antique appearance of the rooms. He thought that the plan set forth of a typical series of the animals, birds, insects, trees, &c., of the forest was all that could be attempted. The complete scientific series would be found in the other Museum at Stratford. He was willing to agree to the modified plans on condition that no high cases be put into the rooms, and that the flat wall-cases should fit into the spaces between the main timbers round the room, as shown in some specimens now in the Museum. He suggested that the Secretary should see Mr. McKenzie, the Superintendent of the Forest, and go into the matter with him.

The Secretary said that he had received a letter from the City Solicitor, stating that the Epping Forest Committee had referred the matter of the plans for the refitting the Museum to Mr. Buxton and the Superintendent of the Forest, to meet him (the Secretary) and make a final agreement. He would in accordance with this request confer with Mr. McKenzie, and lay the plans which had been accepted that afternoon before him, and report at the next meeting.

A vote of thanks to Mr. Buxton for presiding at the meeting was proposed by Mr. Walter Crouch, and seconded by Mr. W. Cole, who referred to the great interest and support which Mr. Buxton had given to the idea of the Museum and to the restoration of the Lodge for many years past.

The vote was carried by acclamation, and in reply Mr. Buxton commended the support of the Fund to their neighbours who would be benefitted by the restored Lodge and the Museum.

THE 199th ORDINARY MEETING.

SATURDAY, DECEMBER 15TH, 1900

This meeting was held at half-past six in the Physical Lecture Theatre of the Institute, Mr. D. Howard, *President*, in the chair.

The following were elected members of the Club :—Mr. Henry C. Norris and Mr. Robert E. Seabrook.

The President asked for an expression of opinion as to the most convenient hour for the winter scientific meetings, whether 6, 6.30 or 7 p.m. On being put to the vote, 6.30 was chosen. In the future, therefore, there will be the usual service of light refreshment in the Tea-room at 5.30, and the Ordinary Meetings will commence at 6.30 p.m.

A pencil drawing of Old Bow Bridge, made just before its demolition, was exhibited by Mr. Walter Crouch, which had been lent to him by his old friend, the Rev. G. Townshend Duffield, Rector of Bow from 1844 to 1880, or over 36 years, when he accepted another Brazenose living in Northamptonshire. The drawing, of large folio size, was made for him by his nephew, Mr. Duffield, now of Liverpool, and depicts the ancient structure from the south-east bank of the River Lea on the Essex side. Mr. Crouch remarked that it was certainly the best view of the Bridge he had ever seen; and shows well the massive starlings and buttresses, with the iron stanchions which had been inserted to keep the Bridge from bulging, and also to strengthen the north side which had to bear the thrust-strain of a wooden footway which was in part supported by cantalivers of wood fixed on the starlings on that side.

The river-side of the "Bombay Grab" is well shown, a quaint old inn on the Middlesex bank with a tier of three large bay windows. This house was pulled down when the New Granite Bridge of one span (which cost £12,000) was erected under Sir John Rennie in 1837-39, during which period the traffic was served by a temporary wooden bridge constructed in 1835.

Old Bow Bridge was a most interesting structure for it was here (at the *straight ford* or Stratford ferry) by repute that the first arched or *bow* bridge was erected; which old Leland termed "a rare piece of worke, for before the time the like had never been seen in England" while this was described as "very ruinous" and in need of repairs in 1366; and thus since the closing of the ancient road which passed through the *old ford*, about a mile northward, has formed for at least 800 years the great highway between London and our county.

A similar view taken from the same position is reproduced on page 21 of "The History of the parishes of East and West Ham" by Katharine Fry, published in 1888. This picture, however, shows the Bridge after partial demolition; and also the wooden one which carried the traffic during the period of reconstruction.

Mr. Howard also made some interesting remarks on the history of the Bridge and the ancient highway into London. It was suggested that the history of this highway and the bridges of the Lea might well form the subject of a paper in the *ESSEX NATURALIST*.

Mr. A. S. Kennard gave an account of a paper by himself and Mr. B. B. Woodward, F.L.S., entitled "Notes on the Mollusc *Paludestrina jenkinsi*, Smith, in Essex and elsewhere"

This paper is printed in the present part of the *ESSEX NATURALIST*.

A cordial vote of thanks was passed to the authors for the paper.

Mr. F. Enock, F.L.S., F.E.S., then delivered a lecture announced in a humorous syllabus as "Aquatic Autocrats and Fairies" being an account of the results of many years close observations made by the lecturer upon the life-histories of Insects inhabiting ponds, some of whose habits and economy have never before been fully worked out; while the biology of others are entirely new to science. And the lecture may be considered as of a *local* character, because Mr. Enock informed his audience that the whole of his "material" had been collected from the ponds in Epping Forest.

The species noticed included the Great Carnivorous Water-beetle (*Dyticus*) belonging to the Coleoptera, the Water-scorpion (*Nepa cinerea*), *Hydrometra*, and the "Water-boatman" (*Notonecta glauca*) all belonging to the Bugs or Hemiptera. The transformations of one of the greater Dragon-flies (*Æschna*) were demonstrated by a truly wonderful series of photographs showing the gradual development of the nymph into the perfect dragon-fly. The extraordinary habits of the minute aquatic parasitic Hymenoptera (*Plectiscichia* and *Polynema*) were also described. The illustrations were, without exception, the personal work of Mr. Enock, who had been enabled, after years of experiments, to produce unique series of photographs from the *living* creatures showing the individual transformation of the eggs, larvæ and nymphs into the perfect imagoes. It is probable that such photographs indicating by *movement* the development of living insects has never before been thrown upon the screen.

Both the President and Prof. Meldola, in proposing a hearty vote of thanks to the lecturer, congratulated him on the valuable results of his patient labours. Prof. Meldola made some extended remarks on the study of the life-histories of insects, which is a field so little explored, but one capable of affording most noteworthy advances in natural history. He also alluded to the curious physical conditions under which aquatic insects lived, such as the assistance to or control over their movements given by the surface-film and to the tremendous internecine warfares in which the insect inhabitants of every pond engaged. He looked upon Mr. Enock's lecture as a really remarkable contribution of Entomological Science.

In returning thanks, Mr. Enock gave some hints on methods of working in such observations, and made some amusing remarks illustrative of the long-continued patience often required to achieve such results as those described in his lecture.

ANNUAL REPORT OF THE COUNCIL FOR THE YEAR ENDED DECEMBER 31st. 1899.

[Read and adopted at the 20th Annual Meeting, postponed (on March 31st) to November 21th, 1900.]

The report which the Council has the honour to present to the members may be put into a few paragraphs, as apart from business connected with the Essex Museum of Natural History, the work during 1899 was of a routine character.

FINANCE—The accounts for the year 1899, which are at length laid before you, were audited in May by Messrs. J. D. Cooper and W. Crouch, to whom the Council is much indebted for their services. On comparing these accounts with those for 1898 it will be seen that the debit balance shown on the General Account has been reduced from £43 8s. to £26 9s. 1d. Postage was reduced from £18 os. 7d. to £15 os. 3d. It will also be observed that, in accordance with the agreement with the Corporation of West Ham, a sum of £50 (for the year 1899) was transferred to the Museum Maintenance Account. It will further be noted that, owing to the satisfactory sales of publications, the long-standing deficiency on that account has been reduced from £25 to £18—in round numbers. The other accounts call for no especial mention until the summary is reached, when it will be seen that the Life Composition Fund was, on December 31st, represented by £57 4s. 8d. in cash, as against £28 13s. 2d. in 1898; and that the total deficiency on all accounts had been reduced by a sum of £23 4s. 2d., leaving it at just over £50, an amount which, if the present policy of the Council is adhered to, will soon be eliminated from the accounts.

MEMBERSHIP—During the past year 1899 the Club has lost one member by death, thirteen by resignation, and two by removal; and it has elected twenty-three new members, leaving a nett gain of seven members. This brings the total membership, inclusive of Honorary Members and Life-Compounders, up to 296.

ESSEX MUSEUM (WEST HAM) MAINTENANCE FUND.

Receipts.		Expenditure.	
£ s. d.	£ s. d.	£ s. d.	£ s. d.
To Balance	68 11 3	By Rent at Woodgrange Road	15 3 4
West Ham Corporation (1970)	100 0 0	Removal, packing, etc.	5 17 0
General Account for Amount transferred under Agreement dated July 25th, 1898	50 0 0	Curator's Stipend	80 0 0
		Railway Fares	11 15 0
		Disbursements, as per his account	20 2 0
		Fire Insurance	1 2 6
		Sundries	9 12 6
		Balance at Bank (£68 11s. 3d.) and in Curator's hands (£6 14s. 10d.)	74 18 11
	<u>£218 11 3</u>		<u>£218 11 3</u>

LIFE COMPOSITION ACCOUNT.

£ s. d.	£ s. d.
To Balance from 1899, being the amount due in respect of the Life-Compositions of existing Members	115 0 6
Life-Composition paid by Mr. Sinclair	10 10 0
	<u>£125 10 6</u>
By Transfer to General Account—	
Mr. H. Ramsden, deceased	5 5 0
Mr. C. F. Leaf, "	5 5 0
Balance forward	115 0 6
	<u>£125 10 6</u>

SUMMARY OF BALANCES, JANUARY 1st, 1901.

£ s. d.	£ s. d.	£ s. d.	£ s. d.
To Essex (West Ham) Museum:—		By Cash at Lloyd's Bank:—	
Equipment Fund	65 4 9	Equipment Fund, Essex Museum...	65 4 9
Maintenance Fund	74 18 11	Maintenance Fund, Essex Museum	68 4 1
Life-Composition Account	149 3 8	Re-organization Fund, Forest Museum	5 9 1
Forest Museum Account	115 0 6	Balance (portion of Life Composition Fund)	51 13 8
	5 9 1		190 11 7
	<u>£260 13 3</u>	By Cash in hands of Curator:—	
		Maintenance Fund	6 14 10
		General Account	5 8
		Library Account	1 15 0
		By Investment on account of Life Compositions at cost price (guaranteed)...	8 15 6
		By Deficiencies:—	45 12 6
		General Account	7 0
		Special Memoirs and Publications Account	15 6 8
	<u>£260 13 3</u>		<u>15 13 8</u>
			<u>£260 13 3</u>

Having examined the above Accounts with the books, vouchers, and pass-book, we find them in accordance therewith and correct.

WALTER CROUCH,
JOHN D. COOPER, } *Hon. Auditors.*

N.B.—The Club possesses other Assets, consisting of Stock of Publications, Books, MSS., Copyrights, Specimens, Cabinets, etc.

MEETINGS.—Eleven meetings (including the Annual Meeting) were held during the year, which, as usual, have been very fully reported in our Journal. In connection with these meetings the Council has great pleasure in recording the thanks of the Club to those who aided in various ways. Amongst others the following should be specially mentioned:—Prof. Watts and Mr. J. V. Holmes, lantern demonstration of photographs of geological interest at the meeting on January 28th, 1899; Mr. J. J. Vezey, Treasurer of the Quekett Microscopical Club, and Mr. D. J. Scourfield, to whom the Club was indebted for an excellent lantern demonstration of the Pond-life in Epping Forest, on February 25th; Mr. Fredk. Enock, F.L.S., for one of his graphic and original lantern lectures, "The Life-history of the Tiger-beetle" at the meeting on March 25th; on April 22nd Mr. and Mrs. E. N. Buxton most kindly entertained the Club to a garden party at "Knighton"; on June 15th we had again to thank Major Flower and the Lee Conservancy Board for the loan of the "Salisbury" for the voyage on the Lea from Hertford to Waltham Abbey; on that occasion also we were indebted to Mr. Corble, the Clerk to the Conservancy, for 50 copies of the pamphlet "Walton's Favourite River" for distribution on board, and to Mr. Mark Davies for notes on angling in the river; to Mr. Winstone for an account of Rye House, to Mr. Holmes for notes on the topography of the Lea, and to Mr. W. M. Webb for demonstration of the river and river-side mollusca. On June 24th a meeting was held at Charlton, Kent, to meet the members of the Croydon Natural History Society, when Dr. F. Parsons and Mr. N. F. Robarts were conductors. At the meeting at Fowlness on July 22nd, Mr. W. H. Dalton gave his services, and members of the Club were kindly entertained at "afternoon tea" by the Rector, the Rev. R. H. Marsh. At the Annual Cryptogamic Meeting we had the assistance of Dr. Cooke, Mr. Massee and Prof. Boulger. Mr. Rudler kindly gave a demonstration at the Museum of Practical Geology on December 16th, so ending the sessional meetings.

The Council acknowledges again with gratitude the facilities given by the Technical Instruction Committee of the Borough of West Ham and by Mr. Briscoe, the Principal, for the meetings in rooms in the Institute. Most unfortunately our winter meetings were interrupted by the disastrous fire which occurred at the Institute on October 23rd, 1899. This sad event diminished the number of our meetings, and much upset arrangements in other ways.

The advantages of a commodious and fixed assembling room for the winter session has been forcibly emphasised by the experiences of shifting the meeting places during the last few years. With the new museum and library, the rooms in the Technical Institute will furnish facilities that the Club has never before possessed. As announced in one of the circulars to the members the object the Council has in view is to resume the old plan of Winter Meetings at *fixed dates*, with the Institute Museum and Library as the rendezvous.

It is by no means intended that *Winter Meetings* should not be held occasionally in other centres; the meetings at the Institute will be *fixed* ones, while those held elsewhere will be announced from time to time by Special Circular, as Field Meetings are advertised.

With respect to the proposed Annual Congress of East Anglian Natural History Societies fully explained in the last Annual Report and in the *ESSEX NATURALIST* (vol. x., pp. 360-368) no progress has yet been made. Our Secretary found that circumstances would prevent the Secretaries of the other Societies taking any very active part in the heavy organisation work during the year, and the great influx of his own Club affairs precluded the possibility of his undertaking such a task unaided. The matter has, therefore, been allowed to rest in abeyance until the summer of 1901, when it is intended to take active steps to bring the project forward. The Council are still much impressed with its importance, but the negotiations will, it is feared, be difficult. However, no efforts will be spared to follow up the successful meeting of July, 1898, by an equally important gathering in 1901.

THE ESSEX NATURALIST.—Owing to the great pressure of work on our Secretary and other causes, the publication of the *Naturalist* was somewhat delayed: two quarterly parts were paid for during the financial year, but a double part was prepared by the end of December, which brought the Journal up to date, and gave the members over 200 pages of matter within the year. It is with great satisfaction that the Council point to the really valuable papers published, almost wholly of a local character, and to the warm praise which the scientific press continue to give to our Journal. The only source of regret is the irregularity in its dates of publication, but it is hoped to remedy this as other Club affairs get settled, and our work can be carried out with more ease. The Council has to thank Mr. H. A. Cole for drawings to illustrate papers, and Mr. F. W. Reader for assistance to the Editor in preparing Mr. Kenworthy's paper on the Skitts Hill discoveries for the press. And the thanks of the Club are also due to Mr. E. T. Newton and Mr. Rudler for much assistance and advice in this connection.

ESSEX MUSEUM.—The work on the collections and specimens for the Museum during the year 1899 was principally carried out at the temporary premises at Forest Gate. The Curator worked there almost continuously, being very often aided by Mr. H. A. Cole. A vast number of specimens were obtained and prepared. A successful effort was made to obtain specimens of most of the terrestrial mammals known from Essex, and many skulls and other educational preparations were made. The Curator also carried out some dredging work in the Colne Estuary, and so obtained specimens of many of the more characteristic invertebrates of our coast. Mr. W. H. Dalton again gave us the benefit of his valuable services day by day for weeks together, in selecting the Crag Mollusca and other geological specimens, and he also most generously paid the lodging and other expenses of an assistant for some time. Mr. L. Owen most kindly acted in this capacity principally in connection with the geological series, and the thanks of the Club are due to him for his valuable and persistent work.

The final settlement of affairs and the opening of the building took place during the past summer and autumn. The narrative will, therefore, come naturally in next year's reports. The business connected with the agreement and removal from Chelmsford was fully detailed last year, and for the opening ceremony the Secretary prepared a pamphlet giving a short statement of the constitution, aims and methods of the Museum, which has

been published as one of the Museum "*Handbooks*." To this pamphlet the members are referred at the present time. The Council will now content itself by again recording its satisfaction at the settlement of this most important question; the establishment of the Museum on a permanent basis and the selection of a Head-quarters for our Library and official work, cannot fail to have a beneficial influence on the future progress of the Club.

THE EPPING FOREST MUSEUM.—The Council has very great pleasure in recording a most substantial progress at the Forest Museum. Referring to the reports for 1897 and 1898, in which the then state of the negotiations with the Corporation Committee were related, the Council has to announce that at a meeting of the Common Council of the City of London held at the Guildhall on April 27th, 1899, a Report from the Epping Forest Committee recommending the repairs of the Queen Elizabeth's Lodge and the re-conversion of the rooms on the first floor into one large room, was received and adopted, and a sum of £500 was voted towards the expense of such repairs. These repairs were carried out during the winter of 1899-1900.

The only other matter calling for notice on this occasion is recording the satisfaction that the Council had in again recommending Mr. Howard for election as President, so that the opening ceremony of the new Museum might take place during his tenure of the office.

THE CORRESPONDING SOCIETIES COMMITTEE OF THE BRITISH ASSOCIATION, BRADFORD, 1900.

REPORT OF THE CLUB'S DELEGATE, PROF. E. B. POULTON, F.R.S., F.L.S.

[The first conference was held on September 6th, when Prof. Poulton presided. The principal subject for discussion were some resolutions put forward by the Yorkshire Naturalists' Union, copies of which had been sent by post to the corresponding Societies previous to the meeting. The draft resolutions were as follows:—

" 1. That the Conference of Delegates be allowed to meet on the first day of the British Association Meeting, and make their own arrangements for subsequent meetings and order of business.

" 2. That it is desirable, in order to make the discussions of the Conference of Delegates more useful to the local Societies, that they should have the power of deciding the subjects for discussion at the meetings of the Conference, and it is suggested, therefore, that a circular be sent by the Committee every year to each of the Corresponding Societies, asking them to send a list of subjects for discussion (not more than two or three) at the forthcoming meetings. The Committee then to send to the Corresponding Societies a schedule containing the titles of all the subjects proposed for discussion, asking each Society to mark such of these subjects as it deems most desirable to discuss at the Conference meetings. On receipt of this information the Committee will then arrange the list of subjects in order of precedence as

indicated by the support given to each subject by the Societies; and a copy of this should be sent to the Delegates or Societies as an agenda paper before the first meeting of the Delegates."

In bringing forward these resolutions Mr. Harold Wager, representing the Yorkshire Naturalists' Union, which comprises a large number of local Societies, said that the Union had called together a committee consisting of a number of their more prominent members, and they had formulated the two resolutions copies of which had been distributed. It was considered most important that the representatives of the local Societies should, if possible, themselves suggest the subjects for discussion. Much good work had been done at these Conferences, but those whom he represented thought that if direct suggestions from the local Societies were invited, the wants of the Societies would be more advantageously considered than they had been in the past, and that they would come into closer touch with each other.

A very long discussion took place, which is fully reported in the *Reports* of the Association, and the following are Prof. Poulton's remarks concerning the same.—ED.]

I went to the first meeting of Delegates at Bradford fully prepared to support the motion of the Yorkshire Naturalists' Union, and quite thinking it reasonable that questions of local Natural History Society organization and management were more appropriate subject for the meeting of Delegates than the consideration of papers which might be read in the Sections. It soon appeared, however, that no suggestions of the kind for the year 1900 had ever reached the Organizing Committee. Only one suggestion had been offered to the Committee and that they had accepted.

The general conclusion of the meeting was, therefore, that no revolutionary measures were necessary until the regular methods had been exhausted, and that the first thing to do was to induce the local Societies through their secretaries to forward to the Organizing Committee suggestions of subjects bearing on management and organization.

I was, unfortunately, obliged by the necessity for attendance at another section, to be absent from the second meeting of Delegates at which there was a paper by Prof. Miall on "Dewponds," followed by an interesting discussion.

In order to carry out my instructions at the first meeting, I invite the Essex Field Club to discuss questions of organization and decide upon special subjects for the Secretary to suggest to the Organization Committee as suitable for the deliberations of the Delegates at Glasgow.

EDWARD B. POULTON.

Oxford.

A NOTE ON THE GULLERY IN HAMFORD WATERS, ESSEX.

By PERCY CLARK, B.A.

Owing to unfortunate circumstances this summer (1900) I was prevented from prosecuting my usual researches into the condition of the Black-headed Gulleries in Essex.

Of the three gull-nurseries which I briefly described last year (*ESSEX NATURALIST*, *ante* pp. 184-190), I was only able to visit one, which, however, is interesting as being I believe of quite recent origin—viz., that situated in Hamford Waters (Gullery No. 3 in paper referred to). Of this I send a short note.

One June 28th, 1900, I sailed from Harwich in my boat and made for the scene of my discovery in the previous season, but I found the gulls had entirely deserted the island-salting which they had utilised for breeding purposes the year before.

They had not wandered far however, for I found their colony not half-a-mile away on another salting, but in a much more exposed and accessible position, bordering the main channel.

It was a very high tide, being close on new moon, and I was able to row up a narrow creek right into the heart of the saltings which were all awash. Having on sea-boots I waded out a short distance and very quickly discovered nine or ten nests, all close together and loosely constructed on the edge of various creeks, where the marine grass grows thickest. Most of them contained three eggs, some two, and a few one, but all the eggs were lying in the water, and the only nests built high enough to be beyond the reach of the tide were empty. The eggs however were still quite warm so that I think the gulls and other birds who build in marshy places, hatch off their young in spite of the water that frequently submerges the nests.

It would be interesting to know whether this fact has ever been definitely ascertained.

I could not penetrate far into the saltings, as the creeks were too wide and full of water to cross on foot, but I counted 75

birds wheeling overhead, although there must have been considerably over this number, as the saltings stretch for a great distance and the gulls were much scattered.

My Skipper who landed subsequently in a different spot found another batch of several nests, so that a large number of gulls certainly bred again this season in Hamford Waters.

The eggs were hard set, as I picked up one which was floating out to sea (a common occurrence I fear at these spring tides) and discovered inside a young one fully formed.

It is to be hoped that the gulls were eventually successful in their rearing operations, but I was not there to see and again I would express the wish that some naturalist at Walton might be found, who could in the summer keep one eye on the birds, and another on the lads from the adjoining farms, and publish his experiences through the medium of the *ESSEX NATURALIST*.

EPPING FOREST FUNGI: REPORT ON THE SPECIES OBSERVED AT THE FUNGUS FORAY ON OCTOBER 6th, 1900, INCLUD- ING TWO NEW TO BRITAIN.

By GEORGE MASSEE, F.L.S.

[As recorded in the report of the "Cryptogamic Meeting" in the present part, Mr. Masse, in conjunction with Dr. M. C. Cooke, kindly undertook the examination of the species collected, and he has since sent in the following notes.—ED.]

Of the larger fungi 152 species were collected, among which were two new to the Essex Mycological Flora, viz:—

Tricholoma variegatum, Scop., and
Cortinarius scutulatus, Fries.

Among the Micro-Fungi, especially those occurring on dung, many very interesting species occurred, two of which had not been previously recorded for Britain, while many are new to the Essex flora.

PYRENOMYCETES.

- **Sordaria decipiens*, Winter. On rabbit dung.
- **S. coprophila*, De Not. On horse dung.
- **S. curvula*, Fr. On cow dung.
- **Sporormia intermedia*, De Not. On horse dung.
- **S. minima*, Auersw. On horse dung.
- †*Delitschia insignis*, Mouton. On horse dung.

DISCOMYCETES.

- **Lachnea crucipila*, Cke. On horse dung.
- Mollisia cinerea*, Karst. On dead wood.
- Helotium virgultorum*, Lmk. On dead wood.
- **Orbilbia xanthostigma*, Pers. On damp rotten wood.
- Ascobolus furfuraceus*, Pers. On horse dung.
- **A. vinosus*, Berk. On rotten dung.
- **A. glaber*, Fr. On horse dung.
- **Rhyparobius sexdecemsporus*, Crouan. On horse dung.
- **Ascophanus granuliformis*, Bond. On horse dung.
- **Gymnoascus reesii*, Baran. On horse dung.

PHYCOMYCETES.

- Pilobolus crystallinus*, Pers. On cow dung.

HYPHOMYCETES.

- †*Sporodesmium piriforme*. Corda. On horse dung.
- **Sterigmatocystis dubia*, Sacc. On horse dung.
- **Oedocephalum fimetarium*, Sacc. On horse dung.
- **Fusidium griseum*, Lmk. On dead oak leaves.

The above list shows that our knowledge of the Fungi of Essex is by no means complete, and among the minute species more especially, probably hundreds of forms at present growing in the county are unrecorded. *Delitschia insignis*, new to

† Indicates species new to Britain.

* Those new to Essex.

Britain, is one of the most beautiful among the many remarkable forms of micro-fungi growing on old dung. It was found by Mr. E. S. Salmon.

At the next Fungus Foray of the Club it is intended to make an exhibit of drawings of some Essex Micro-Fungi.

FURTHER CONTRIBUTIONS TOWARDS THE KNOWLEDGE OF THE ARACHNIDA OF EPPING FOREST.

By F. O. PICKARD-CAMBRIDGE, B.A.

A first contribution towards the knowledge of the Arachnida (Spiders, "Harvestmen," "False-scorpions" and Mites) of Epping Forest was published in the *Trans. Essex Field Club* in 1883 (vol. iv., pp. 41—49), by my uncle, the Rev. O. Pickard-Cambridge. There has not, to my knowledge, been any serious collecting done in the Forest itself, or even in the County of Essex, since that time, except by myself in the Dunmow district in 1889.

This year, however, through the zealous energy of Mr. William Cole, the subject was again brought to the attention of Members of the Field Club, and on the occasion of the Annual Fungus-Foray a definite effort was made to increase the knowledge of this group already gained and to add to the published list of species.

Although the Foray was held rather late in the season for arachnological research (for the majority of spiders have by that time retired into winter quarters), still a very encouraging addition was made to the list, chiefly through the efforts of Mr. F. P. Smith, whose articles on British Spiders now appearing in *Science Gossip* will, it is hoped, arouse some interest in the subject amongst Field Naturalists in general.

Altogether, on the occasion of the Fungus-Foray on October 6th, 1900, 42 species of spiders, including one "Harvestman," were added to the previous list which accounted for 57 species of spiders, 3 "Harvestmen," 3 "False-scorpions," and 4 Mites.

Amongst those added were a few of the largest and most interesting of British spiders—*Amaurobius ferox*, for instance, a

black villainous-looking creature, is found in cellars and out-houses, behind boards, etc. The sudden apparition of four or five of these behind one board, revealed by the flickering light of a candle in a gloomy cellar, is well calculated to quench the valour of the stoutest naturalist, and usually does so.

Little less alarming is the appearance in one's bedroom of the "Cardinal Spider," *Tegenaria parietina*, careering over the ceiling with its long hairy legs, obviously intending to drop plump on the bed and devastate the unwilling occupant. Cardinal Wolsey, in those days in residence at Hampton Court, was, tradition has it, much terrified at the aspect of these enormous spiders. Hence their name, though the good cardinal, if we are to believe historians, had no silly squeamishness with regard to insects and creeping things in general.

Then, again, the Water Spider, *Argyroneta aquatica*, one of the largest and most interesting of our British spiders, though occurring in many parts of Essex, has, however, only now been definitely recorded for the county. This is really an interesting spider, for it takes to the water as though it were its natural element, swimming with its hairy legs, the body enclosed by a layer of air entangled in the hairs and glittering like silver as it swims. The nest, usually called the "diving bell," is made beneath the surface, and the eggs are laid and the young hatched out therein. There are many points still to be discovered in the habits of this and many other spiders which would well repay the efforts of those who are Field-naturalists and have little opportunity or inclination to enter the depths of the science in the studio, with microscope and section-cutter at hand.

I will now, after these few and more or less relevant remarks, add the list of species which are here recorded for the first time for the fauna of Epping Forest and Essex, and in doing so I would appeal to all Field-naturalists to assist, during the next season, in collecting material for a still larger county list which will appear shortly in the volume of "Essex," of the *Victorian History of the Counties of England*. It would ill become the Essex Field Club to allow their county to rank with those which have but one or two recorded species of spiders to offer, or even haply to sink to the level of those pitiable districts of which the Arachnologist can scarcely even recall the name.

In the following list the initial "S" indicates the species for which Mr. F. P. Smith is responsible, and "P-C" my own records.

Family—DYSDERIDÆ.

- Harpactes hombergii** (Scop.) Under bark (S.)
Segestria senoculata (L.) Under bark (S.)

Family—CLUBIONIDÆ.

- Clubiona pallidula** (Clerck). Herbage (S.)
Anyphæna accentuata (Walck.) Bushes (S.)
Agroeca brunnea (Blackw.) A female and egg-cocoon (S.)

Family—THOMISIDÆ.

- Philodromus aureolus** (Clerck). Common (S.)

Family—SALTICIDÆ.

- Ballus depressus** (Walck.) Loughton (S.)

Family—LYCOSIDÆ.

- Lycosa accentuata**, Latreille (P-C).
L. ruricola (De Geer). Under stones (S.)
Pirata piraticus (Clerck). Swamps, Loughton (S.)

Family—AGELENIDÆ.

- Tegenaria parietina** (Fourcroy). Outhouses (S.)
T. atrica (C. L. Koch). Hollow trees and outhouses (S.)
Argyroneta aquatica (Clerck.) Ponds near Whipps
 Cross, Walthamstow (S.)
Circurina circurea (Fabr.) Under loose bark (S.)

Family—DICTYNIDÆ.

- Amaurobius ferox** (Walck.) Snaresbrook (P.C.)
A. similis (Blackw.) Outhouses at the "King's Oak,"
 High Beach (P-C).
Dictyna uncinata, Thorell (S.)

Family—THERIDIIDÆ.

- Theridion tepidariorum** (C. L. Koch), Paul's Nurseries,
 High Beach (S.)
T. denticulatum (Walck.) Epping Forest (P-C).

Family—ARGIOPIDÆ.

- Tiso vagans* (Blackw.) Among *debris* in a dried up ponds.
- Gonatium rubens* (Blackw.) Beaten from bushes, abundant (S.)
- Trachygnatha dentata* (Wid.) Very common on the reeds by the side of the Grotto, Wanstead Park (S.)
- Erigone dentipalpis* (Wid.) A male near Loughton (S.)
- E. atra* (Blackw.) Snaresbrook (P-C.)
- Hilaira uncata* (G. P-Camb.) A male of this rare species was found in a half dried-up swamp at Loughton (S.)
- Microneta viaria* (Blackw.) Epping Forest (S.)
- Bathyphantes gracilis* (Blackw.) Several males amongst grass (S.)
- Lepthyphantes nebulosus* (Sund.) Snaresbrook (P.C.)
- L. minutus* (Blackw.) Under loose bark, males and females (S.)
- Labulla thoracica* (Wid.) A female at High Beach (S.)
- Floronia bucculenta* (Clerck.) High Beach (S.)
- Pachygnatha degeerii* (Sund.) Abundant, males and females (S.)
- P. clerckii* (Sund.) Common; mostly females (S)
- Zilla x-notata* (Clerck.) On walls and fences (S.)
- Z. atrica* (C. L. Koch.) Not common. (S. and P-C.)
- Araneus umbraticus* (Blackw.) Under bark. One female (S.)
- A. patagiatus* (Clerck.) Males and females (S.)
- Cyclosa conica* (Pallas.) Snaresbrook (P-C.)

Order—OPILIONES.

- Nemastoma lugubre*, Müller (P-C.)
- Phalangium saxatile*, C. L. Koch (P-C.)
- Opilio agrestis*, Meade (P-C.)



To
Miss Delya Harwood

OPENING OF THE ESSEX MUSEUM OF
NATURAL HISTORY BY THE COUNTESS
OF WARWICK, AND THE RE-OPENING
OF THE WEST HAM TECHNICAL INSTI-
TUTE BY MR. PASSMORE EDWARDS.

IMPORTANT SPEECHES ON THE OBJECTS AND METHODS
OF LOCAL MUSEUMS AND ON TECHNICAL EDUCA-
TION, BY LADY WARWICK, MR. PASSMORE EDWARDS
AND PROF. MELDOLA.

THURSDAY, OCTOBER 18TH, 1900.

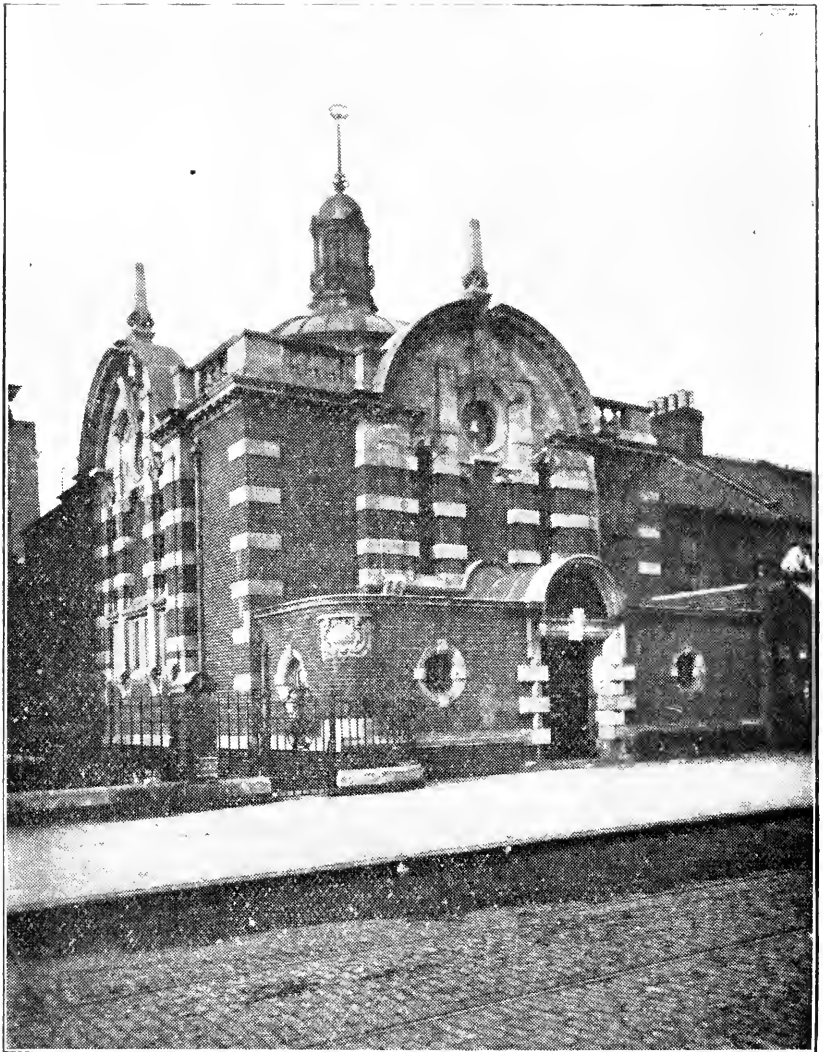
[With Plates VIII. and IX.]

The inception and progress of the Essex Museum of Natural History has been fully recorded in the *ESSEX NATURALIST*, and in the annual reports of the Council of the Club since the original proposal was placed before the Town Council of the Borough of West Ham in the autumn of 1897. The Foundation-stone of the Museum was laid by Mr. Passmore Edwards on October 6th, 1898 (*ESSEX NAT.*, X., pp. 337-46) and one year later on the above-named afternoon, October 18th, 1900, the completion of the second stage in its development was gracefully and worthily emphasised by the public opening of the building by the Right Honourable the Countess of Warwick. On the same afternoon the magnificent Municipal Technical Institute, which had been partially destroyed by the disastrous fire of October 23rd, 1899, was re-opened by Mr. Passmore Edwards to whose generosity the friends of the Museum are so greatly indebted.

For the purposes of the meeting the Curator had prepared a pamphlet which explained the scheme of the Museum and the principles of the agreement between the Corporation of West Ham and the Essex Field Club. It also contained a description of the building kindly furnished by Mr. S. B. Russell, A.R.I.B.A., the Architect. To this *brochure* the reader is referred¹

The ceremony of opening the Museum came first and a large company of guests (members of the Corporation and the

¹ "The Essex Museum of Natural History, . . . A short statement of the Constitution, Aims and Methods of the Museum" (with portrait of Mr. Passmore Edwards.) By W. Cole, F.L.S., F.E.S., Curator. Price 3d.



THE ESSEX MUSEUM OF NATURAL HISTORY.

Club, the Staff of the Institute, and inhabitants of the Borough and their friends) awaited the arrival of Lady Warwick in the Museum building.²

Her Ladyship arrived just after six o'clock, and was conducted by the Mayor (Alderman R. White) to the first floor of the Museum. Accompanying His Worship were Mr. Passmore Edwards, Councillor F. H. Billows, J.P. (Chairman of the Technical Institute and Libraries Committee), Mr. David Howard, J.P. (President of the Essex Field Club) and many others.

The Mayor, on behalf of the burgesses, the West Ham Town Council, and the Essex Field Club, welcomed her Ladyship and Mr. Passmore Edwards, who had graciously accepted the invitation to open the Museum and Institute. (Applause.) He called upon Mr. David Howard to make a statement and to ask the Countess to declare the Museum open.

Mr. Howard said that twenty-one years ago the Field Club was started for the study of natural history and similar scientific pursuits in the county of Essex. In the course of their work they had got together collections of considerable interest, but which were unavailable because they lay in rooms, cellars, cupboards, and packing boxes. They could not show these specimens to the public, and the Field Club desired that they should be able to exhibit the results of arduous labour. A point of importance was that the student would now have the Museum to refer to, and it must also be noticed that the members of the Club had contributed generously from their own private collections so that they should be laid open for public use and for the public benefit. They all thanked Mr. Passmore Edwards for his magnificent generosity—(loud applause)—and for the manner in which the subject had been wisely approached by the Town Council of the Borough. The collections which they had there were only a beginning; do not let them think they were completed. The more one worked the more completion appeared a long way off. He thought enough had already been given and put before them to show how very important to different students that Museum was, and how much more it would prove to be. They were asking the Countess of Warwick to open the Museum because of the great interest which she took in education of all kinds, not only of the kind before them, but of other of more practical and modern application. He asked her to open the Museum. (Loud applause.)

Mr. S. B. Russell, the architect, presented her Ladyship with a richly ornamented key of the Museum enclosed in a casket.

Lady Warwick considered it a great honour, as well as a pleasure, to have been asked to come and declare that Museum open. In common with other Essex people the welfare of the county lay very close to her heart, and she

² We are indebted to the excellent report in the *West Ham Guardian* of October 20th for the main portions of our account of the opening, supplemented by the reports in the *South Essex Mail*, the *Essex Times* and other papers.—ED.

thought that the munificence of Mr. Passmore Edwards was one which would be appreciated to its greatest extent by the county. She would again thank them for the honour conferred on her, and she had much pleasure in declaring the Museum open to the public. (Applause.)

Councillor F. H. Billows said that the part of the Museum was hardly complete. The lower portion of the building would be kept for the Essex Club, and the upper part would be utilised as a local art gallery for West Ham. A commencement in the placing of statues of their prominent men would be made that evening, when Lady Warwick would be invited to unveil a bust of Mr. Passmore Edwards, who was worthy of occupying a prominent place as first Citizen of West Ham. (Loud applause.)

Lady Warwick then proceeded to the staircase, where she unveiled the bust, which had been presented to the Museum by Mr. H. C. Fehr, the sculptor.

The company then adjourned to the spacious Central Hall of the Institute, where a great company had already seated themselves.

The Mayor took the chair, with the Countess of Warwick on his right hand. There were also present Mr. J. Passmore Edwards, Mr. Ernest Gray, M.P., Prof. Meldola, F.R.S., Archdeacon Stevens, Mr. David Howard, Aldermen Athey, Ivey, and Bethel, Councillors Coe, Thorne, Ward, Bissell, Barber, Bothwell, Halsey, Godbold, Horne, Threlford, McDowall, Bishop, C. Mansfield, Weaver Smith, Crow, Stewart, Kettle, and Billows, Dr. Hilleary (Town Clerk), Mr. E. A. Briscoe, B.Sc. (the Principal of the Institute), Mr. W. Cole (Hon. Secretary to the Essex Field Club), and very many others interested in the Borough, in the work of the Club and in popular education.

The Mayor again briefly welcomed both Lady Warwick and Mr. Passmore Edwards.

Councillor F. H. Billows explained to the company present that the hall was hardly complete after the re-instatement. He then detailed the cause of the re-opening, which was the fire which broke out in October last, and remarked upon the growth of the Institute. There were about 1,640 students who had enrolled, being 110 in excess of the corresponding period last year. There was every prospect of a good session's work. The Principal (Mr. Briscoe) and his staff had had to cope with almost insuperable difficulties which had caused them great anxiety. He hoped that they would never have such an experience again. It was evident that the Institute, like the Phoenix, had risen from its ashes, and could now look forward to a long career of life and success. It was now their pleasure to ask Mr. Passmore Edwards to re-open the Institute. (Applause.)

Mr. Passmore Edwards was received with great applause on rising to speak. He said he wished that he had the privilege of reading a speech. He knew he could make up a good one at home, where he would have leisure to construct rounded sentences. Immediately he began to speak his recollection failed, and on more than one occasion when he had been called upon to open an institute he had sat down without having performed that duty. He did



Your faithfully
J. Palmer Edwards

not want to make that mistake now, but at once, in the name of Literature, Education, and Science declared the building open, and to hope that its work would be for the good of the district in particular, and for the welfare of mankind in general. (Loud applause.) The preceding speaker had said that the building had arisen from its ashes like the Phoenix. That was so, but instead of waiting 500 years as the bird did in the myth, they in West Ham had got another building together in 500 days, whilst only a fortnight after the destruction of the central part of the building they had begun work in other parts of the district. They showed that energy and courage were their civic virtues. It was a testimony to the British workman and the architect, Mr. Russell, that they were enabled to meet in that building that evening. (Applause.) Now they had got it, what were they going to do with it? That was the question they would have to decide. It was called a Municipal Technical Institute. That was a very good name, but he thought it would be a great deal better if they called it the "People's University," or the "West Ham University." They had got a library which was almost unsurpassed in London, a library of some 50,000 volumes, and no one could tell, day by day, how much good those books would do in illuminating or improving the character of the people of West Ham. He came down to the library on Tuesday to see the Librarian, and he saw four or five little children at the counter asking for books for their mothers and fathers. They had not only the library, but an institution which was one of the most valuable aids to science—the Museum. (Applause.) Thus they had a trinity in unity—the Library, Institute and Museum. They had a triune institution, and he hoped they would turn it to proper account. A motto which had been put over a door in Thebes read as follows—"Books are the best medicine for the soul"—but he suggested instead of that motto being placed above their Institute it should read "Let there be light." He believed the Institute would be turned to good account, he was sure of that from what he had heard. It was most necessary that they should succeed, for it was to the national interest that institutions of that kind should be promoted in the country. He did not like it to be stated that England had to follow the lead of other nations; continuous efforts should be made by the country to secure a leading position. Was it right that England, with its vast wealth and great growth, that it should be left behind by Germany or America? No, it was not; they should seek to march side by side on the path of progress. Therefore these institutions had a national interest. The number of people in West Ham was growing prodigiously, and it was (as was the case in other large towns) growing at the expense of the country, and it was necessary that the Institute should be made of great benefit to all classes who came. (Applause.)

The Mayor then asked the Countess of Warwick to address the meeting.

Lady Warwick, who was also heartily received, said: I have to thank you for inviting me to speak this evening.³ I follow Mr. Passmore Edwards with diffidence, because he is one who has always shown a practical sympathy with the work of education, whilst I feel that I am only a theoretical champion on that subject. I am here this

³ Lady Warwick's speech is reprinted from the verbatim report in the *West Ham Guardian*. Ed.]

evening primarily as a member of the Essex Field Club, an association founded twenty years ago, and which has been carrying on active work throughout this period. We have with us to-day Professor Meldola, the first President of the Club, who, if I mistake not, in his inaugural address, contemplated the establishment of a museum which should contain collections illustrating the natural history, geology, and pre-historic archaeology of our county. This original idea of the founders of this Club has never been lost sight of, but for various reasons it has hitherto been found impossible to bring it to a practical issue. A few years ago an attempt was made to establish the Club's Museum in Chelmsford, and it is perhaps to be regretted that this attempt could not be successfully realised. An Essex Museum would have found an appropriate home in the county town, and I may perhaps venture to take this opportunity of expressing the hope that the nucleus of a museum which is in existence they may yet be developed in conjunction with the Essex Field Club. For I am convinced that museums are destined to play such an important part in education in the future that no town of any importance will be able to be without an institution of this kind. But one of the chief reasons why this part of the Club's work has not hitherto been practically realised is because the establishment and maintenance of a museum requires considerable financial resource. However zealous the members of a county Natural History Society may be, their aims and objects rarely rouse popular enthusiasm to the extent of raising an adequate fund for such purposes. In some counties private munificence has compensated for the lack of public interest. In other cases—and I am glad to be able to quote as an example another Essex town, Colchester—an enlightened Town Council has enabled an excellent local museum of archaeology to find an appropriate home. And, again, in other instances some of the County Councils have given financial aid from the Technical Instruction Grant—quite a legitimate expenditure as it appears to me, and, if I may express a personal opinion, a most valuable way of assisting in the spread of that knowledge which is the core and essence of all sound education—a knowledge of nature at first hand as distinguished from the knowledge imparted through books, or didactically taught in the class room. But I am afraid that we, as a nation, have hardly yet risen to that high water mark of scientific culture which should characterise a great civilisation. I do not mean to imply that we are lacking in scientific ability, or that we are devoid of originality, or that we have failed to contribute our share of knowledge to the sum total of human progress. But I fear that the spirit of modern science has not sunk into the public mind; it has not permeated the rank and file to that extent which is required by the age in which we live, the century of science *par excellence*. Our purses are ever open, and have always been open, in the names of charity and philanthropy, religious endowment, and missionary enterprise, political organisation and popular sports. (Laughter.) But science, upon which the national welfare and our position in the scale of nations ultimately depends, has to go begging for her tens, while thousands are forthcoming for other objects. (Applause.)

With regard to the particular Museum which I have been asked to open to-day, it is with special pleasure that I am enabled to point to this practical realisation of the scheme of the Essex Field Club as the outcome of private

munificence and enlightened forethought on the part of Mr. Passmore Edwards, combined with the splendid public spirit of the Town Council of West Ham. (Applause.) To our ever zealous Secretary, Mr. William Cole, belongs in the first place the credit of having advocated (and successfully advocated) the claims of the Essex Field Club to have a permanent home for the collections which in the course of twenty years have been gradually formed under his auspices. Of his skill as a curator it is not for me to speak—the collections, although at present far from complete, and at this early stage, but in the first period of their arrangement, will tell their own story. And, as another justification for the gratitude which all we members of the Essex Field Club owe to Mr. Cole, I need only refer to the excellent little Epping Forest Museum in Queen Elizabeth's Lodge at Chingford, which was opened a few years ago, and for which a home was provided by the Corporation of London. (Applause.) The late Sir William Flower once said the proper way to establish a museum was to find a curator, and then let him build his museum around him. We have found our Curator! Mr. Passmore Edwards and your Town Council will enable us to carry out the complete programme. (Applause.)

The nature of scope of a local museum have, as I learn from my friend Professor Meldola, been frequently considered at meetings of the Field Club, and I can hardly hope to add anything to the views which have been expressed on this subject by specialists. But you will permit me to offer my congratulations to your Museum Committee for the thorough manner in which they appear to have realised what a local museum ought to be. The days have gone by when the museum, so-called, of a country town was considered well furnished if it contained a promiscuous collection of rubbish gathered together haphazard from all quarters of the globe. (Laughter.) The local museum which can alone meet the ideal requirements of the present age should be a perfectly organised registry office where all the natural products of the district comprised can be seen by students, preserved so as to be capable of identification, and displayed to the best advantage. The classification of the contents of such a museum should be systematic, and the labelling of specimens so complete and descriptive that each may tell its own story. And, above all, the museum should be what it professes to be—LOCAL. (Applause.) Collections illustrating what species of animals, birds, insects, plants, &c., inhabited a particular district at a certain period, and what species were inhabitants during past geological ages, will be of enormous value to the present generation, and of even great value to future generations. The foundation of a local museum for purposes of study and reference is as valuable—perhaps even more valuable—than a public library, for the drift of modern thought in the direction of scientific education is towards a knowledge of nature rather than a knowledge of books. (Applause.) With the alterations brought about in any district through natural agencies, or through man's interference, there must arise changes in the living inhabitants. Old species die out, new ones are introduced. The sea is encroaching on our Essex Coast and removing, as I am told, deposits containing fossils of unique interest—the sole representatives of a particular kind of life that flourished here ages and ages ago. Such relics of the earth's past history are worthy of being most religiously preserved in the local museum, to which institution all students should naturally

be able to turn for reference and information. So also with the history of early man in Britain. What more appropriate home for the rare specimens of his handiwork in the way of weapons, ornaments, pottery, &c., than the museum of the district in which such relics are found? All this and much more than I can ever tell you of is no doubt quite familiar to all members of the Essex Field Club, but I have ventured to state the case for local museums again because to-day we inaugurate a departure in the management of such museums, which is somewhat novel in the history of similar undertakings. The associations of a County Museum with a Technical Institute is a kind of alliance which cannot but prove most helpful to both. For while those who are responsible for the contents of the museum, the naturalists, have a very large task before them to supply the series of specimens required to represent the county flora and fauna, &c., the West Ham Council supplies that guarantee of permanence without which local enthusiasm in all museums is apt to die out. Mr. Passmore Edwards may feel assured that his munificence will prove fruitful for the future, while the naturalists may go to work with redoubled zeal in order to assist in filling the cabinets with collections worthy of their Country and their Club. (Loud applause.)

In another way also does this association of the museum with the institute appear to be a beneficial one. The students attending the classes of such an Institute as this are for the most part engaged in studying those sciences which are classed under the general term "physical," viz., physics, chemistry, engineering, and so forth. The existence in the same building of a museum in which may be seen the various animals and plants which inhabit the county may serve as an incentive for some among them to enlarge the scope of their studies in that direction—in the direction of "natural" as distinguished from "physical" science, and so to enter upon leisure-time pursuits which are as healthy physically as they are mentally. For, indeed, there is no antagonism between the various departments of nature; all is one "harmonious whole," and there is no reason why the most expert electrician, or chemist, or engineer, among us should not be able to look with intelligent interest upon nature's handiwork, and to follow in the footsteps of the wise king, who "spake of trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall: he spake also of beasts, and of fowl, and of creeping things, and of fishes." In other words I wish to insist upon the educational value of a museum such as that which we are inaugurating. It is true that the development of the museum on purely educational lines will require new and somewhat costly sets of preparations, but it is evident that a museum so happily connected with a technical institute as our Essex Field Club Museum offers unprecedented advantages for such development. (Applause.)

I have once again to congratulate our premier Natural History Society on this successful culmination of their scheme. It augurs well for the future success of your undertaking to hear, as I have, that your collections are already too large to be displayed to full advantage in the space at your disposal. But this is a healthy sign; it is one of those instances where it will be found better to suffer from surfeit than to languish from starvation. (Hear, hear.) I am requested also to point out that in spite of the large quantity of

material that has been accumulated, there is still an immense amount of collecting and preserving to be done to give anything approaching an adequate idea of our county's natural history. The growth and organization and arrangement of the contents of a museum must necessarily be a work of time. You are asked to-day to see but the beginning of a new departure in the history of the Essex Field Club—a departure for which our most grateful thanks are due to Mr. Passmore Edwards and to the Town Council of West Ham. (Loud applause.)

And now that you have so kindly invited me to speak about the Museum, may I ask you to now let me say one word upon your Technical Institute, because it is chiefly as an educational enthusiast that you have so kindly invited me to come here to-day, and knowing well the enlightened and advanced views of West Ham I confess that the re-opening of the Technical Institute was one that attracted me immensely, and it has been a great pleasure to listen to the address of such a public benefactor as Mr. Passmore Edwards. May I venture to hope that, as this Institute has been built for the people of this vastly populated district, it may be used by the people. (Loud and continued applause.) It has so often happened that such institutes are captured by well-to-do people, and are not the benefit to the unprivileged workers which they ought to be; and West Ham and Stratford should hold before themselves the ideal that a course at the Technical Institute should be within the reach of every West Ham and every Stratford child. (Hear, hear.) It is indeed not sufficient to say that a number of scholarships are available for competition by the children of parents in receipt of a total income of not more than £150 per annum, as in the case under the technical education board of the London County Council. The child of the weekly wage earner—say, 25s. to 30s. per week has small chance in competing with the child of the man who has a salary paid monthly or quarterly of £150. (Hear, hear.) The former works by the hour and one hour's loss of work means loss of an hour's pay; the conditions in the two homes are very different. In that of the weekly wage earner, by the hour, in times of sickness, yes, even in times of health, the children of ten become bread winners even before they leave school, to become full-timers in the workshops. I am specially thinking of the boys and girls selling matches, paper boys, who get up before 6 o'clock in the mornings to sell papers and go to school worn out and sleepy at 9 o'clock. It is, of course, easy to blame the parents and preach to them that they ought to have higher ideals for their children, and tell them of the scholarship ladder which we are assured extends from the slum to the University. Crowded dwellings, a sordid struggle to keep the wolf from the door, and the perpetual dread of the workhouse, are not compatible with the high ideals in education, and perhaps the prosperous ones of the earth should not be too ready to blame such people for looking with eagerness to the time when the little ones will be able "to earn a few shillings." Of course it will be said by some, that I am taking a sentimental view of this question, and they will say, "What about the money spent in drink?" Has not the time come in this England of ours when we should cease to punish the children for their parents' sins—even of poverty and drunkenness—and say that whatever we do with the parents, the children shall not suffer, but shall all have the opportunity of

going forth adequately equipped for the battle of life? (Loud applause.) I feel sure that in this district you will make the "scholarship ladder" become a reality to the poor, and a strong step in this direction should be possible. There is a powerful Co-operative Society in West Ham, and if they have surplus money, why not spend it in scholarships for the children of Co-operators to enable them to pass through the Technical Institute? What a splendid example they would be giving to the community. What Lord Rosebery so aptly termed "The state within the state" should set the pace for the greater state. The question should not, however, be left wholly even to Co-operators (wealthy as these may be), but should be faced by the community as a whole; and if it is to be well with England in the future we must not neglect the cry of the child bread winners who go into the streets and workshops with imperfectly developed bodies and minds, and who a few years later are called upon to have a voice in controlling the destiny of the Empire. Is it too much to hope that in the next few years the "leaving age" shall be at least fifteen? And that maintenance scholarships without competition, say perhaps of £10 a year for two years, shall be given to all children who have passed through the standards in the elementary schools, and who have reached a certain standard of efficiency? This will be costly you will say, but all good things are worth paying for. And out of our immense wealth an adequate educational expenditure will surely evolve, when people realise as they do more and more that an ignorant democracy is our worst heritage to posterity. (Loud applause.) Being myself truly in earnest in these questions, I have come to West Ham because I feel that down here there are many who feel on the questions as deeply as I do; and try to throw light on many questions that are puzzling other districts. I read some of your local papers, and I know how feeling runs high in West Ham. I know that there are some who have the courage to give expression to what they feel. I am here to help in the work of the great education question, which means so much to the men and women of this country in the future, and I am sure you are determined to place this class upon a more serious basis, and that we shall no more have to consider other countries ahead of us on this question. The educational question is the most serious one of the social programme. I wish prosperity to the opening of this Institute and Museum, and hope it might indeed prove most beneficial to the district of West Ham and Stratford. (Loud applause.)

At the conclusion of her address the Countess was presented with a bouquet by Mrs. Page on behalf of the students at the Institute.

Prof. Meldola said that by virtue of his antiquity as first President of the Essex Field Club he had been asked to propose a vote of thanks to the Countess of Warwick. As the resolution was of the nature of a self-evident proposition he thought that no particular arguments were necessary to commend it to their notice and that he might therefore afford to be a little discursive. In the first place as a representative of the Essex Field Club he took the opportunity of saying how deeply concerned they all were last autumn to hear of the sad disaster which had befallen the Technical Institute, and how rejoiced they were now to be present at this ceremony in celebration of its restoration. He thought that such Institutes had a great future before

them and were destined to play an important part in national technical education. They had seen enough of "pottering" education in the counties and he considered that the great advantage of such institutes was the *systematic nature* of the instruction which they offered. He was particularly glad to see from their programme that systematic courses extending over several years had been organised for their evening department. He took occasion also to congratulate the Committee of the Borough Council for the extremely enlightened way in which they appeared to be conducting the affairs of the Institute as manifested by the excellently equipped laboratories and workshops. It appears to have been realised that education like everything else was in a state of development—that methods and appliances were continually undergoing modification, and that no educational body could afford to remain in a state of suspended animation. The spirit of modern requirements had been entered into by their Committee and an Institute worked under such auspices was bound to succeed. (Applause.)

He desired in the next place to take that opportunity of publicly thanking on behalf of the Club those to whom they were indebted for material assistance in bring the Museum to its present state. First and foremost his old friend, Mr. William Cole, deserved mention and his services had already been alluded to by Lady Warwick. Then it was obvious that in starting such an undertaking they had a certain amount of "red-tape" to get through. He did not use the term in the offensive sense as signifying procrastination and delay—the necessary legal formalities had on the contrary been carried through with remarkable expedition by their Hon. Counsel (Mr. Dare), and their Hon. Solicitor (Mr. Coburn), who had been met in the most cordial spirit by the excellent Town Clerk (Dr. Hilleary). To all these gentlemen he considered that their warmest thanks were due. With regard to the stocking of the Museum with specimens he thought that special mention should be made of the voluntary services of Mr. W. H. Dalton, who had not only given a magnificent collection of Crag fossils, but had himself undertaken their classification and arrangement. Valuable contributions had been received also from Mr. Harting, from Mr. Carvalho and many others, but time did not admit of his thanking them individually.

Passing now to the immediate resolution before them he considered they were very much indebted to Lady Warwick for coming there and putting, with her usual grace, that crowning touch to their work. She was a busy lady—in fact one of the busiest ladies he knew. There were many ladies who went about busying themselves with things that nobody particularly wanted and which would have been very much better left alone. It was all the difference between a busy person and a busybody, and his good friend and colleague was a busy lady in the very best sense of the term. He was perhaps, in as good a position as anybody to explain how much they really were indebted to her ladyship for giving them her time because he had for some years been associated with her in her educational work in another part of the county, and he knew from personal experience what enormous demands were made upon her time and what zeal she threw into every branch of her work. Her presence there that evening and the good work she was carrying on elsewhere might serve as brilliant examples to other ladies of her station.

He concluded by moving "that the best thanks of the meeting be given to the Countess of Warwick for her attendance and for the admirable Address which she had delivered." (Loud applause.)

Councillor W. Crow, on behalf of the West Ham Town Council, seconded the resolution, and also referred to Lady Warwick's interest in the important question of education. He was rather afraid that she would have to make some allowance for the West Ham Town Council. The Council had, however, done very useful work, and they were doubly pleased to know that that work had received the kindly notice of her Ladyship.

The Countess replied that she was very grateful to them, for it had afforded her a great pleasure to come among them. On future occasions she hoped not to be forgotten by West Ham people, because she knew what an active part they took in educational matters. In spite of all Councillor Crow had said, she sat down with a glorified idea of the Town Council of West Ham. (Loud applause.)

Alderman Bethell then moved a vote of thanks to Mr. Passmore Edwards, and referred to the many gifts which that gentleman had made to West Ham from time to time. Not long ago, said Alderman Bethell, he had offered to erect a library in the southern portion of the borough, but the burgesses could not see their way clear to accept the offer. He (the speaker) was pleased to say that Mr. Passmore Edwards was still willing to carry out his pledge on condition that the burgesses would support the library. A slight increase in the library rate would do it, and he hoped that West Ham would yet be able to accept the offer. He felt sure he was only expressing the wishes of them all when he hoped that Mr. Passmore Edwards would live long to continue the good work he had in hand.

Councillor Weaver-Smith seconded the resolution, and expressed the hope that the burgesses would rise to the occasion and accept the offer of Mr. Passmore Edwards.

The vote of thanks was carried amid much applause.

Mr. Passmore Edwards said he might say that had he known that they would have had such a brilliant speech from Lady Warwick, he would have set to work to make a better speech than he had done. (Laughter and applause.) He had no objection to being left behind, but he refused to be eclipsed. (Applause.) He could only say, in answer to their kind vote of thanks, that the borough had been good to him. Some five or six years ago when unknown amongst them he was asked to open the Canning Town Library, and then the new wing of the hospital, and again was presented with the freedom of the borough in a magnificent silver casket. Since then he had done a little for West and East Ham. There were five institutions he had assisted to work in the district, and probably there would be two more. (Hear, hear.) Thus West Ham would have what he stated at one time of Cornwall, seven sisters of stone. He felt that they were more entitled to his thanks than he to theirs; and he would promise with Lady Warwick, that he would occasionally come and give his services to his dear old friends in West Ham. (Applause.)

The ceremony closed with a vote of thanks to the Mayor for presiding, moved by Councillor Alden and seconded by Councillor Steward. Councillor Alden remarked that, although the Mayor was practically an infant in the chair, he was by no means an infant in municipal work, for he had been an earnest worker in the Town Council for every good cause.

The Mayor acknowledged the vote, after which the company made a tour of inspection round the Museum and Institute.

After the ceremony of opening the Technical Institute was over, the Countess visited the Library, and was greatly interested in the arrangement of the various rooms, which were explained to her Ladyship by Mr. Cotgreave, the Borough Librarian. She was particularly pleased with the juvenile department and the ladies' reading-room, and expressed her intention of paying another visit when she had sufficient time to inspect the whole of the Library. Before leaving, her Ladyship signed the visitors' book, and accepted copies of the *Souvenir of the Opening of the Institute* and Mr. Cotgreave's *Contents-Subject Index to English Literature*.

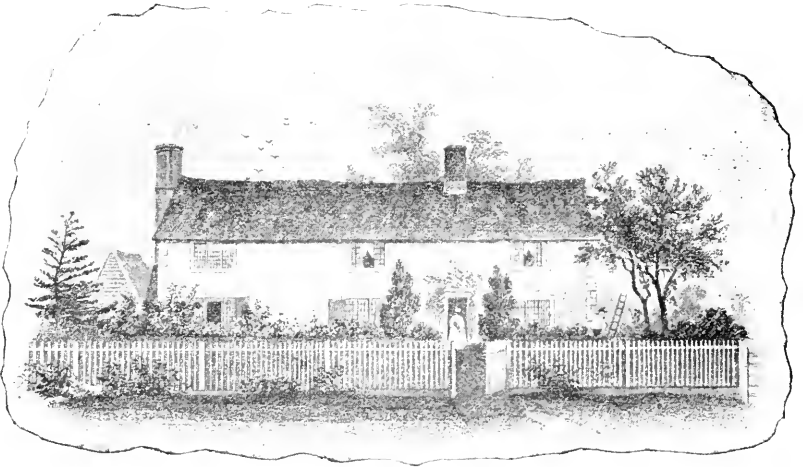
[The portrait of Lady Warwick is from a photograph specially taken; that of Mr. Passmore Edwards is lent by Mr. Cotgreave, the Borough Librarian, and the view of the Museum is kindly lent by the Editor of the *South Essex Mail*. Another portrait of Mr. Edwards is given in the *Museum Handbook No. 3*, alluded to above. ED.]

DESTRUCTION OF JOHN RAY'S HOUSE.

The most interesting local memorial of the greatest of English botanists has perished by fire—"Dewlands," the "Mecca of Essex naturalists," for 25 years the residence of John Ray, can never again be the focus of such meetings as those held by the Club at this picturesque old house in 1885 and 1898. It was on the afternoon of September 19th last that this grievous disaster occurred. How the fire commenced is a mystery; one account suggests the smouldering of a beam near the flue, another that linen hung by the kitchen fire was the cause. All the family were out; the owner, Mr. Charles Turner, working in the fields near, was only able at some risk to rescue a few valuable articles, and by the aid of neighbours to remove some of the furniture. The Braintree Fire Brigade arrived in a short time, and did good service by preventing the flames from spreading to the farm buildings, but nothing could be done to save the house, which burned with extreme rapidity, being built of timber and plaster. The house was insured, but

all will regret that the sum does not at all represent the loss Mr. Turner has sustained in furniture and personal property.

We have been unable to obtain any recent photograph or drawing of "Dewlands" and therefore reproduce the view given in *The Correspondence of John Ray*, published by the Ray Society in 1848. The birthplace of Ray, in the opinion of Prof. Boulger, was probably a house adjoining the village forge at Black Notley, but it is almost certain that he built Dewlands for his mother, and in this house she died. Ray wrote in his diary:— "March 15th, 1678, being Saturday, departed this life my most



Dewlands, Black Notley, Essex. The Residence of John Ray.
Burnt down September 19th, 1900.

dear and honoured mother, Elizabeth Ray, of Black Notley, in her house on Dewlands, in the hall-chamber, about three o'clock in the afternoon, aged, as I suppose, seventy-eight." Prof. Boulger writes "the naturalist was probably with her at the time, and on the 24th June, 1679, *i.e.*, of the following June, he moved to the Dewlands, 'where,' he says, 'I intend, God willing, to settle for the short pittance of time I have yet to live in this world,' and where he did actually pass the remaining twenty-five and a half years of his life in industrious scientific research." ("The Domestic Life of John Ray at Black Notley," by Prof. G. S. Boulger, *Journ. of Proceedings, E.F.C.*, vol. iv.,

pp. clix.-clxiv.) Ray himself died at Dewlands on Wednesday, January 17th, 1704-5, and was buried in the churchyard of Black Notley. The position of Ray as one of the pioneers of natural science stands now supreme, and this aspect of his varied labours was admirably expounded by Prof. Boulger in his address on "The Life and Work of John Ray, and their relation to the progress of science" in the *Transactions* of the Club, vol. iv., pp. 171-188. The *London Standard* had an appreciative leading article on the great naturalist on the occasion of the destruction of Dewlands, in which it was said "the very men who superseded his work have been among the first to bear testimony to the value of his labours. He opened the way for others, in what was an almost tractless forest. A recent continental authority declares that in one of his books Ray 'wrote in the style of a modern text-book' and that he 'possessed an exceptional power of distinguishing the relationships of the vegetable kingdom. His accurate observations and systematic descriptions receive universal praise.' * * * If we cannot claim for Ray quite so high a position in natural history as his junior, Isaac Newton, occupied in mathematics and physics, he was a man of whom English science may well be proud."

Essex is indeed poorer by the loss of a relic so closely bound up with the life of one of her most illustrious sons

NOTES—ORIGINAL AND SELECTED.

ZOOLOGY.

AVES.

Nutcracker at Bradwell.—On October 27th a fine specimen of the Nutcracker (*Nucifraga caryocatactes*) was shot in this parish. It is now in the possession of Mr. Clement W. Parker, who has had it set up by Ashmead, of Bishopsgate. *Essex Weekly News*, November 2nd, 1900.

Mobbed by Woodpigeons.—Mr. A. W. Ruggles Brise, of Spains Hall, Finchingfield, communicated the following to the *Field*.—"On December 22nd, 1900, a phenomenal fog and darkness overspread this neighbourhood from 4 p.m. to 9 p.m., unprecedented within the memory of the oldest inhabitant. Several labourers on the estate lost their way home, and were obliged to shout for help, and got home by the aid of a lantern, taking some hours to do so. My head keeper, who, with myself and others, had been out shooting all day, had the greatest difficulty in getting home, even on the road,

and on his starting back to his house, about a mile off in the wood, a lantern was suggested. With this he set out, and, on arriving at a 40-acre wood, he thought he would go down the main ride to his house. No sooner had he shut the gate, which made some little noise, than he was surrounded by numbers of woodpigeons, attracted by the light, which flew around him, knocking off his hat. Having a stick in his hand, he struck at them for some minutes, knocking a great many down; but eventually had to beat a retreat and go home outside the wood. Early the next morning he went to the spot, and picked up 21 pigeons on the ride and close by. This seems to me a most remarkable occurrence. I may add that my head keeper is a man of great experience of animal life, and has never before seen or heard of such an extraordinary thing. There are hundreds of woodpigeons here this year, owing to the number of acorns. The darkness was so great that no light was visible above or below except for a few feet."

INSECTA.

Rare Spingidæ in Essex.—When looking over the collections of Mr. W. H. B. Fletcher, at Bognor, I came across two specimens which are worth recording with a view to inclusion in any county list of Lepidoptera that may be compiled. The first, *Charocampa celeris*, has the following inscription on the label:—"Taken off a wall in Queen's Road, Upton Park, Essex, by a working man named Bond, who gave it to the late Mr. W. C. Dale on July 12th, 1883. Mr. Dale, then of Jeville Road, Worthing, gave it to me [W.H.B.F.] in June 1888."

The other specimen is *Dedeiphila galii* labelled "Tottenham, July, 1859," from the late Mr. Howard Vaughan's collection. Tottenham is perhaps hardly within the county but it is on the border,—(PROF.) R. MELDOLA

ACARINA.

Black Currant Bud-Gall Mites. *Phytoftus ribis*.—This pest is proving very destructive to Black Currants throughout the country and the damage is becoming more extensive every year. Although it has been known for over half a century, it is only within the last eight or nine years that it has attracted so much attention. In Kent the Black Currant crop has been much reduced of late years, and I hear of it from many places in the West of England and elsewhere. I have also lately heard of several instances in different parts of Essex where the Mite is very prevalent. The buds swell up in late summer and autumn, and when they burst in the following spring they grow for a short time only, and the result is that there is little or no fruit. The Mite is a different species to that which attacks the Hazel and causes the buds to swell in the same way. Two other species have a similar effect upon the buds of the Birch and Yew. The greater part of their existence is spent inside the buds where they occur in thousands, and this constitutes the great difficulty in destroying them, as no "wash" can get at them. They are to a certain extent spread by birds, and bushes can also be attacked through the medium of infected soil. I have lately been trying various methods with a view to getting rid of the pest, including fumigation with hydrocyanic acid gas. I have not up to the present time met with any

authentic case in which the mite has suddenly appeared in a plantation, when the cause cannot be traced back either to propagation from infested stock, or to the fact that the soil has been previously infected with a crop of diseased black currants. If any correspondent who has had any experience with the mite among his currants would be good enough to give any information on the subject, especially with regard to the cause of its first appearance on his bushes, and any methods he may have adopted to get rid of it, and with what success, I feel sure that it would be of great interest not only to myself but also to anyone who is unfortunate enough to be troubled with the pest.—E. J. LEWIS, F.E.S., Wye, Kent.

BOTANY.

Flowers on Christmas Day, 1900.—It may be of some interest to record the following plants in actual bloom on Christmas Day in the neighbourhood of Witham:—*Bellis perennis*, *Leontodon taraxacum*, *Crepis virens*, *Ruscus aculeatus*, *Sisymbrium alliaria*, *Chærophyllum temulum*, *Poa annua*, *Stellaria media*, *Veronica agrestis*, *Lamium album*, *Lamium purpureum*, *Senecio vulgaris*, *Arrhenatherum avenaceum*, *Trisetum flavescens*, *Ulex nanus*, *Primula vulgaris*, *Ethusa cynapium*, *Sisymbrium officinale*, *Capsella bursa-pastoris*, *Sonchus oleraceus*, *Daphne mezereum*, *Lychnis dioica*, *Achillea millefolium*, *Matricaria chamomilla*, *Rubus*, *Anthemis cotula*, *Matricaria inodora*. The record of the Umbellifer—*Chærophyllum temulum*—seems to me to be unique, as the usual one to flower out of season is *Anthriscus sylvestris*.—EDWIN E. TURNER, Coggeshall

Blossoming of Crab-Trees in the Forest in 1900.—I do not think that the year 1900 should pass without some mention of the extraordinary abundance of bloom and subsequently of fruit on the Crab-trees (*Pyrus malus*) in the Forest. Even those well acquainted with the trees of the forest were astonished thus to find what a large number of Crabs existed. For instance, in May last, in the short distance, say three-fourths of a mile, from the cross-roads diverging at the "Wake Arms" to the top of Goldings Hill, Loughton, I, in a cursory way, noted from the road, taking each side, at least 100 trees, and all in most luxurious blossoming. There must be many thousands in the whole forest. Later on, when the fruit had fallen, there was a distinct smell of the fragrant apples all over the woods. Such a sight as the forest presented last May will not I think again be possible for many years. The "oldest inhabitants" told me that they never remembered such a show of blossoms.—S. ARTHUR SEWELL, Buckhurst Hill.

The Black-Currant (*Ribes nigrum*) in Epping Forest.—On the afternoon of the Fungus Foray 6th October, 1900, I found *Ribes nigrum* growing freely in the swamp close to the eastern side of the "King's Oak" enclosure, High Beach. I have never before seen it in the forest.—F. W. ELLIOTT, Buckhurst Hill. [This appears to be a new station. We cannot find any previous record of the Black Currant for the forest area. It occurs rarely in several parts of Essex mostly in swampy places. Bentham and other botanists doubt that it is truly indigenous, as it was cultivated in very early times, and there is commonly a suspicion that plants found are aliens, escapes from gardens.—ED.]

Nuts imbedded in a tree-trunk.—About the middle of December last, some large elm trees were cut down in a field belonging to the late Mrs. Mildred, at Chigwell. At the base of one of the trees, about 5 feet from the ground, in the centre of a trunk 18 inches in diameter, was found a quantity of nuts—the fruit of the Hazel. They were most perfect, but on being opened, the kernels were perished. There was no opening in the trunk or any communication of any kind with the outside, so that these nuts may have been deposited by a squirrel more than a century ago. It appears from several instances of the kind that trees quickly close up articles deposited in a chink or hollow. I exhibited a blade of a razor extracted from the heart of a horn-beam in the Forest at the meeting of the Club on February 25th, 1899 (*ante* page 27).—S. ARTHUR SEWELL, Buckhurst Hill

[Several occurrences of a similar kind are recorded in our publications. In 1883 Mr. Edinger gave an account of the finding of a bird's nest with eggs in it, enclosed in the wood of an elm tree (see *Journal of Proceedings, E.F.C.*, vol. iv., iii.), and Mr. C. E. Benham in 1894 recorded an example of inscribed letters having been covered up for many years by the growth of the woody tissue of an elm near Colchester. *ESSEX NAT.*, vol. viii., p. 88.—ED.]

CONTRIBUTIONS TO THE PLEISTOCENE GEOLOGY OF THE THAMES VALLEY. I. THE GRAYS THURROCK AREA, PART I.

By MARTIN A. C. HINTON and A. S. KENNARD.

WITH A SUB-SECTION ON THE FOSSIL FISHES.

By E. T. NEWTON, F.R.S., F.G.S.

[Read October 27th, 1900.]

I. INTRODUCTION.

It is to be doubted if any geological period is of greater interest than the Pleistocene, for it is the borderland of geology and history. From the early days of geological enquiry to the present time, it has attracted the attention of many of the ablest intellects who have striven to unravel the tangled web of the earth's past history. Dr. Buckland, Sir Charles Lyell, Sir Joseph Prestwich, William Whitaker, Professor James Geikie, the Woods, father and son, Alfred Tylor, John Brown, F. W. Harmer and many others too numerous to mention have endeavoured to read the secret hidden in the beds often spoken of as the "Drift," and yet in spite of this research there is no branch of science where there is greater

divergence of views. Gravels considered by one observer to be marine are by another termed fluviatile, whilst a third pronounces them to be glacial. Into the causes of this divergence of opinion it would be futile to enter, yet we are disposed to consider that a careful survey of the Pleistocene Deposits of the Lower Thames Valley will throw light on many points and may solve some of the problems. It is our intention to make a detailed examination of these deposits, and thus to lay the foundation for further speculation in this connection. The present paper contains the results of our work in the Grays district, and we venture to think that the nature of these results justifies us in bringing them before the Essex Field Club.

We would here take the opportunity of thanking the numerous friends who have so kindly aided us in our researches, and we would mention Dr. C. W. Andrews, F.G.S., Dr. H. P. Blackmore, F.G.S., Dr. Frank Corner, F.G.S., Mr. C. V. Crook, M.A., Mr. J. P. Johnson, Mr. Clement Reid, F.R.S., and Mr. B. B. Woodward, F.G.S. Mr. W. Lewis Reid has accompanied us in the field on many occasions and has materially helped us in many ways. To Mr. E. T. Newton, F.R.S., our warmest thanks are due. He has kindly identified the fish remains, a truly laborious task, and we are also indebted to him for the sub-section of this paper dealing with the Pleistocene Ichthyology of Grays.

The Authors desire to place on record their appreciation of the great service done them by Mr. F. W. Reader, who has taken a vast amount of trouble in the preparation of the blocks illustrating this paper, and they here tender him their best thanks accordingly.

II. BIBLIOGRAPHY.

Note.—Some of the works in the following list do not relate to the Grays Thurrock area, but since we have had occasion to refer to them in the preparation of this memoir they merit inclusion here:—

- (1.) 1836. MORRIS (Prof. J.)—"On a Freshwater Deposit containing Mammalian Remains, recently discovered at Grays, Essex." *Mag. Nat. Hist.*, vol. ix., p. 261.
- (2.) 1838. MORRIS (Prof. J.)—"On the Deposits containing Carnivora and other Mammalia in the Valley of the Thames." *Mag. Nat. Hist.*, ser. 2, vol. ii., p. 539.

- (3.) 1838. SOWERBY, (G. B.) "Comparison of *Cyrena*, *Valvata* and *Unio*, found at Grays, with recent species." *Ibid.*, p. 546.
- (4.) 1843. BROWN (JOHN).—"Fossil Remains in Essex (Grays)." *Ann and Mag. Nat. Hist.*, vol. xi., p. 325.
- (5.) 1844-1847. FALCONER (HUGH) and CAUTLEY.—*Fauna Antiqua Sivalensis*.
- (5a.) 1846. FORBES (Prof. E.)—*Memoirs of the Geological Survey*, vol. i., pp. 393-5.
- (6.) 1846. OWEN (Sir R.)—*British Fossil Mammals and Birds*.
- (7.) 1848. OWEN (Sir R.)—"Occurrence of the *Megaceros hibernicus* and of *Castor europæus* in the Pleistocene Deposits of Ilford and Grays Thurrock." *Q.J.G.S.*, vol. iv., p. 42.
- (8.) 1848-1856. WOOD (S. V.)—*Crag Mollusca. Mem. Pal. Soc.*
- (8a.) 1850. JONES (T. RUPERT).—"Descriptions of the *Entomostraca* of the Pleistocene Beds of Newbury, Copford, Clacton and Grays." *Ann. and Mag. Nat. Hist.*, ser. 2, vol. vi., pp. 25-28 (with a Plate).
- (9.) 1855. PRESTWICH (Sir J.)—"On the origin of the Sand and Gravel-pipes in the Chalk." *Q.J.G.S.*, xi., p. 71.
- (10.) 1856. OWEN (Sir R.)—"Description, etc., of a bone of *Cygnus musicus* from Grays"; *vide Q.J.G.S.*, xii., p. 211, pl. 3, fig. 13a and b.
- (11.) 1857. BLASIUS (J. K.)—*Säugethiere Deutschlands*. pp. 338-390, figs. from 177.
- (12.) 1857. FALCONER (Dr. HUGH).—"On the Species of Mastodon and Elephant occurring in the Fossil State in Great Britain. Part I., Mastodon." *Q.J.G.S.*, xiii., p. 307 (and (24) vol. ii.)
- (13.) 1860. BROWN (JOHN).—"On Some Fossil Remains of Mammalia lately discovered in Essex; with Remarks on the Position of the Beds of Drift occurring in that County." *Proc. Geol. Assoc.*, vol. i., p. 29.
- (14.) 1861. JONES (E.)—"Sandpipes at Grays Thurrock." *Geologist*, vol. iv., p. 258.
- (15.) 1863. LYELL (Sir CHAS.)—*The Antiquity of Man*. 1st ed., pp. 157-158.
- (16.) 1865. FALCONER (Dr. HUGH).—"On the Species of Mastodon and Elephant occurring in a Fossil State in Great Britain Part II. Elephant."—*Q.J.G.S.*, xxi., p. 253 (and (24) vol. ii.)
- (17.) 1866. WOOD (S. V., jun.)—"On the Structure of the Thames Valley and its contained Deposits." *Geol. Mag.*, iii., pp. 57-99.
- (18.) 1867. DAWKINS (Prof. W. B.)—"On the Age of the Lower Brickearths of the Thames Valley." *Q.J.G.S.*, xxiii., pp. 91-109.
- (19.) 1867. DAWKINS (Prof. W. B.)—"On the British Fossil Oxen." *ibid.*, pp. 176-184.
- (20.) 1867. DAWKINS (Prof. W. B.)—"The Boulder Clay of the Thames Valley." *Geol. Mag.*, iv., p. 430.
- (21.) 1867. DAWKINS (Prof. W. B.)—"The Age of the Thames Valley Deposits." *ibid.*, p. 564.
- (22.) 1867. MORRIS (Prof. J.)—"On the Occurrence of Grey Wethers at Grays, Essex." *ibid.*, p. 63.
- (23.) 1867. WOOD (S. V., jun.)—"On the Structure of the Post-Glacial Deposits of the South-East of England." *Q.J.G.S.*, xxiii., pp. 394-417. (Corrections in *Geol. Mag.*, v., pp. 43-53).

- (24.) 1868. FALCONER (Dr. HUGH).—*The Palæontological Memoirs and Notes of the late Dr. Falconer*, II. volumes, edited by C. Murchison.
- (25.) 1868. WOOD (S. V., jun.)—"Reply to Mr. Dawkins on the Thames Valley Deposits, etc." *Geol. Mag.*, vol. v., p. 42.
- (26.) 1868. WOOD (S. V., jun.)—"The Ouse Valley, The Thames Valley, etc." *Geol. Mag.*, vol. v., p. 147.
- (27.) 1869. DAWKINS (Prof. W. B.)—"On the Distribution of the British Post-Glacial Mammals" *Q.J.G.S.*, xxv., p.
- (28.) 1869. LUCAS (J.)—"The Boulder Clay and the Thames Valley." *Geol. Mag.*, vi., p. 188.
- (29.) 1869. TYLOR (A.)—"On Quarternary Gravels." *Q.J.G.S.*, xxv., pp. 57-100.
- (30.) 1870. SANFORD (W. A.)—"On the Rodentia of the Somerset Caves." *Q.J.G.S.*, xxvi., p. 124.
- (31.) 1871. PALIN (Rev. W.)—*Stifford and its neighbourhood. Past and Present*
- (32.) 1871. PHILLIPS (Prof. J.)—"Geology of Oxford and the Valley of the Thames," pp. 470-473
- (33.) 1872. BELL (A.) "*Corbicula fluminalis*, its Associates and Distribution." (Geol. Asso.) *Geol. Mag.*, ix., p. 430.
- (34.) 1872. DAWKINS (Prof. W. B.)—"The Classification of the Pleistocene Strata of Britain and the Continent by means of the Mammalia." *Q.J.G.S.*, xxviii., p. 410.
- (35.) 1872. DAWKINS AND SANFORD.—*The British Pleistocene Mammalia. Part IV., British Pleistocene Felidae, etc. Mem. Pal. Soc.*
- (36.) 1872. JOHNSON (M. H.)—"Excursion to Grays, Essex." *Proc. Geol. Asso.*, ii., p. 245.
- (37.) 1872. PALIN (Rev. W.)—*More about Stifford.*
- (37a.) 1872. LUBBOCK (Sir J.)—*Prehistoric Times*, 3rd ed., p. 292.
- (38.) 1872. WOOD (S. V., jun.)—"On the Climate of the Post-Glacial Period." *Geol. Mag.*, ix., p. 153.
- (39.) 1874. BLACKMORE AND ALSTON.—"On Fossil *Arvicolidæ*." *Proc. Zool. Soc. London*, pp. 460-471.
- (40.) 1874. GEIKIE (Prof. J.)—"The Great Ice-Age in its Relation to the Antiquity of Man," Lond., 8vo., pp. 431-485.
- (41.) 1876. DALTON (W. H.)—"Subsidence in East Essex." *Geol. Mag.*, dec. ii., vol. iii., pp. 491-493.
- (42.) 1876. WOODWARD (H. B.)—*The Geology of England and Wales.*, ed. 2, 1887 in which *vide* pp. 517-518.
- (43.) 1876. MORRIS (Prof. J.)—Article in Thorne's *Handbook to the Environs of London*, pt. I., p. 244.
- (44.) 1877. ANON.—"Excursion to Grays, Essex." *Proc. Geol. Assoc.*, v., p. 125.
- (45.) 1877. CLINCH (G.)—"On the Post-Glacial Deposits of the Thames Valley." *Sci. Goss.*, No. 154, p. 224.
- (45a.) 1877-1878. LEITH-ADAMS (Prof.)—*British Fossil Elephants. Mem. Palæon. Soc.*
- (46.) 1878. DAWKINS (Prof. W. B.)—*The British Pleistocene Mammalia. Mem. Palæon. Soc.*

- (47.) 1879. DAWKINS (Prof. W. B.)—"On the Range of the Mammoth in Space and Time." *Q.J.G.S.*, xxxv., pp. 138-147.
- (48.) 1880. ANON. (WHITAKER, W.)—"Geology of the Valley of the Thames" in *Dickens Dictionary of the Thames*, pp. 70-71.
- (49.) 1880. WOOD (S. V., jun.)—"The Newer Pliocene Period in England, Part I." *Q.J.G.S.*, xxxvi., pp. 457-528.
- (50.) 1881. WALKER (H.)—"Excursion to Grays." *Proc. Geol. Assoc.*, vol. vii., pp. 148-149. *Trans. Essex Field Club*, vol. ii., pp. xiii. and xiv.
- (51.) 1882. HARRISON (W. J.) *Geology of the Counties of England and Wales*, pp. 90-91.
- (52.) 1882. WOOD (S. V., jun.)—"The Newer Pliocene Period in England." *Q.J.G.S.*, xxxviii., pp. 667-745.
- (53.) 1882. NEWTON (E. T.)—*Vertebrata of the Forest Bed. Mem. Geol. Survey.*
- (54.) 1883. OWEN (Sir R.)—"Descriptions of Parts of a Human Skeleton from a Pleistocene (Palæolithic) Bed at Tilbury, Essex." *Proc. Roy. Soc.*, vol. xxxvi., p. 156.
- (55.) 1884. HOLMES (T. V.)—"Excursion to Tilbury Docks." *Proc. Geol. Assoc.*, viii., p. 392-396.
- (56.) 1884. OWEN (Sir R.)—*Antiquity of Man, etc.*
- (57.) 1885. HOLMES (T. V.)—"Notes on the Geological Position of the Human Skeleton, lately found at the Tilbury Docks, Essex." *Trans. Essex Field Club*, vol. iv., p. 87.
- (58.) 1888. PRESTWICH (Sir J.)—*Geology*, vol. ii., p. 475.
- (59.) 1889. WHITAKER (W.)—*Geology of London and the Neighbourhood. Mem. Geol. Sur.*, vol. i., pp. 415-420, ii., pp. 21, 31, 57, 58.
- (60.) 1890. ABBOTT (W. J. L.)—"Notes on some Pleistocene Sections in or near London." *Proc. Geol. Assoc.*, xi., pp. 473-480.
- (61.) 1890. NEWTON (E. T.)—"On the Occurrence of Lemmings and other Rodents in the Thames Valley." *Geol. Mag.*, p. 452.
- (62.) 1890. HOLMES (T. V.)—"On some sections between West Thurrock and Stifford on the Grays and Upminster Railway." *ESSEX NAT.*, vol. iv., p.
- (63.) 1891. HOLMES (T. V.)—"Excursion to the New Railway between Grays and Upminster, Essex." *Proc. Geol. Assoc.*, xii., pp. 195-201.
- (64.) 1891. SPURRELL (F. C. J.)—"Excursion to Grays Thurrock, Essex." *ibid.*, p. 194.
- (65.) 1891. NEWTON (E. T.)—*Vertebrata of the Pliocene Deposits of Britain. Mem. Geol. Sur.*
- (66.) 1893. RUTLEY (F.)—"The Dwindling and Disappearance of Limestones." *Q.J.G.S.*, xlix., pp. 372-384, Pl. xviii.
- (67.) 1894. NEWTON (E. T.)—"The Vertebrate Fauna collected by Mr. Lewis Abbott, from the Fissure, near Ightham, Kent." *Q.J.G.S.*, l., p. 188.
- (67a.) 1897. REID (C.)—"On Pleistocene Plants from Casewick, Shackwell and Grays." *Q.J.G.S.*, vol. liii., p. 464.
- (68.) 1897. WEBB (W. M.)—"The Non-marine Mollusca of Essex." *ESSEX NAT.*, vol. x., p. 27 and p. 65.

- (69.) 1897. KENNARD (A. S.) and WOODWARD (B. B.)—"The Post-Pliocene Non-Marine Mollusca of Essex." *ESSEX NAT.*, vol. xi., pp. 101-103 and table
- (70.) 1899. HINTON (MARTIN A. C.)—"Manganese in River Gravels." *Science Gossip*, new ser., vol. vi., p. 146.
- (71.) 1900. HINTON (MARTIN A. C.)—"The Pleistocene Deposits of the Ilford and Wanstead District." *Proc. Geol. Assoc.*, vol. xvi. (evidence of estuarine conditions noted p. 280).
- (72.) 1900. HINTON (MARTIN A. C.)—"On the Pleistocene Deposits of the Ilford and Wanstead District, Essex." *ESSEX NAT.*, vol. xi., p. 161
- (73.) 1900. KENNARD (A. S.) and WOODWARD (B. B.)—"The Pleistocene Non-marine Mollusca of Ilford." *Proc. Geol. Assoc.*, vol. xvi., p. 282
- (74.) 1900. JOHNSON (J. P.) and WHITE (G.)—"On some New Sections at Ilford and Additions to the Fauna." *ESSEX NAT.*, vol. xi., p. 157.
- (75.) 1901. NEWTON (E. T.)—"British Pleistocene Fishes." *Geol. Mag.*, dec. 4, vol. viii., pp. 49-52.

III. HIGH TERRACE DRIFT.

A detailed survey of the High Terrace Drift of the Grays Thurrock Area involves the consideration of certain physiological features of a somewhat puzzling nature. We had finished our examination of the eastern part of this Drift, the physiography of which is described later, and had proceeded somewhat with our work in the western district when it became evident that a description of the latter portion was impracticable in the present communication. Considerations of time and space forced us to reserve our description of the western portion of the High Terrace deposits until next year, when we hope to publish a supplement to this paper.

EASTERN TRACT.

A large patch of gravel extending from Stifford and Grays on the east, between Baker Street and Chadwell to beyond West Tilbury and the confines of our district, forms the eastern tract of the High Terrace Drift of the Grays Thurrock area. There are, however, but few sections to be described in this sheet of Gravel, perhaps owing to the fact that the Lower London Tertiaries come on underneath it in considerable thickness, thus carrying the valuable Chalk out of the range of the local quarryman.

ACCOUNT OF SECTIONS.

(a.) *Sockett's Heath.* Surface level 90 feet O.D. A gravel pit at Sockett's Heath shows about 16 feet of evenly bedded gravel in which Palæolithic implements are fairly abundant.

False bedded material here and there occurs and traces of slight contemporaneous erosion in the form of little filled up channels are sometimes exhibited by the sections. We have obtained many boulders of Wealden or Purbeck ironstone with *Cyprides* from the gravels in this pit, also a boulder of basaltic rock, and some pebbles of "schorl-rock." Large sarsens, which may be seen *in situ* in the Thanet Sand of the district, likewise occur, some of them weighing many hundredweights. In this pit many of the seams of gravel and sand are stained with a hydrous dioxide of manganese, the staining following the dip of the false bedding, and hence proving that the manganese owes its present position to contemporaneous fluvial deposition (70).

(*b.*) A little to the east of Chalk Pit Farm, at the fork of the two roads, an old gravel pit shows a few feet of gravel similar to that of Sockett's Heath.

(*c.*) *Hangman's Wood.* Gravel is exposed here in an old pit at the entrance to the wood. The junction with the Thanet Sand is seen in the shafts of the "Deneholes."

(*d.*) About a third of a mile from the north-eastern extremity of Hangman's Wood by the side of the road leading to Orsett, an old gravel pit shows about seven feet of gravel and sand from which we have obtained implements.

IV. MIDDLE TERRACE DRIFT.

The Middle Terrace Drift of the Grays Thurrock area is found extending in a long narrow strip of brickearth, sand and gravel, commencing near High House on the west, passing through West Thurrock and Grays Thurrock, and ending off to the east of Little Thurrock. The continuity of this band of Drift is broken for a short distance to the west of Grays, by a deflection in the northern boundary line of the Holocene alluvium which here cuts inland as far as the Chalk outcrop. Thus the Drift is divided into two portions—a western and an eastern.

The western tract, with which we shall first deal, has a total length of about three miles. Numerous sections are afforded by the cuttings for the tramways of the various chalk quarries between Grays and Purfleet.

(1.) WESTERN PORTION.

(a.) *Tunnel Cement Works.* A good section of the Middle Terrace Drift as represented in the western portion of the district is exposed in the quarry of the Tunnel Cement Works. This section exhibited, in 1900, the drift piled up against the old chalk cliff which formed the bank of the Pleistocene Thames at this stage in its development.

The beds shown in the section are :—

1. Surface soil and "wash gravel," about 4 feet.
2. Stiff brown loam, about 4 feet.

3. Finely laminated sand, with occasional seams of argillaceous material. Two well-marked bands of pebbles were exposed, occupying respectively the top and bottom surfaces of the middle third of this series. The lower pebble band consisted chiefly of well rounded flints, but in the upper bed in addition to these were many small fragments of chalk, mostly well rounded, and a few unworn chalk flints. Towards the base of the series large chalk pebbles became more abundant, until at last near the junction with the chalk cliff they formed two-thirds of the total detritus. This portion of the series, however, was easily distinguished from the underlying chalk-rubble by its perfect stratification and the well rounded character of the included fragments of chalk. As the beds approached the south, *i.e.*, as they receded from the old bank so the pebbles of chalk became fewer, until not one could be found in the basal portion. In places the beds are somewhat indurated, this condition probably arising from contraction during drying. The arenaceous constituents appear to have been wholly derived from the Thanet Sands of the neighbourhood. The total thickness of the beds included in this division is from 16 to 20 feet.

4. Chalk rubble, angular and unstratified, about 6 feet.
5. Chalk.

Mr. W. J. L. Abbott, F.G.S., described this section in 1890 (60) and recorded several species of the usual larger Pleistocene Mammalia and also seven species of Mollusca. The species are all included in our general list from Grays Thurrock.

(b.) *Pit west of Milwood Lane.* Proceeding eastwards along the London Road, the next exposure of the brickearths is that seen in the tramway cutting of the quarry belonging to Messrs. Gibbs. The section was briefly described by Mr. W. Whitaker, F.R.S., in 1889, in the "Geology of London," (59), and he figures it as it was in 1872. Since that time it has been deepened, but no further detail of much importance is to be seen. The section resembles that seen in the Tunnel Pit in showing the drift piled against an old chalk cliff. The details

do not differ materially from those of the former section with the exception that a somewhat larger quantity of clay is shown. We have obtained bones and teeth of *Bos primigenius*, *Rhinoceros* sp., and *Elephas* sp., here.

(c.) Still further to the east on the other side of Milwood Lane a similar section is exposed in the tramway cutting of the Lion Cement Works quarry. The brickearth series here contains a considerable quantity of irregular chalky gravel, and there are several beds of gravel interstratified with the sand and loam. Towards the southern end of the tramway the section is now much overgrown, but Mr. Whitaker noted (op. cit. p. 418) that "there was at first little but sand; then gravel and sand over loam and clay, sometimes with sand beneath and still further, before getting to the road, gravel and sand only. South of the road again there was sand and loam, with gravelly layers beneath a little gravel, and then gravel only."

A new gravel pit in the Lion Cement Works south of the road and within a dozen yards of the junction of the Drift with the alluvium showed twelve feet of exceedingly coarse and almost unstratified gravel, the base of which was not seen. The gravel clearly overlies the brickearth series to the north as is evident from Mr. Whitaker's notes. Mr. W. L. Reid and the authors have obtained several Palæolithic flakes from this pit.

(d.) *Grays Portland Cement Works.* A good section of the brickearth series is exposed here agreeing in general with those seen in the other pits. It bears a very close resemblance to that of the Tunnel Pit in the very large quantity of chalk pebbles which occur in the lower part of the series.

(e.) Between Purfleet and Grays there are numerous small sections of the gravel exposed in old ballast pits by the side of the railway.

(2.) EASTERN PORTION.

The eastern portion of the Middle Terrace Drift of Grays is of especial interest since the magnificent mammalian remains and the richly fossiliferous shell beds which made the name of Grays Thurrock famous were contained and exposed in this tract. Now, unfortunately, but little of these beds is left, but

that the residue is as productive as any of the famous parts that are gone we hope to show in the sequel.

Orsett Road Section (Fig. 1). On the right hand side of the Orsett Road, between Grays and Little Thurrock, is situate what is probably the most interesting and important section of the Middle Terrace brickearths exposed in this district. Its interest lies in the fact of its being, perhaps, the last section of the famous fossiliferous beds of Grays that will ever be seen. Its importance lies in the great advance in our knowledge of the Pleistocene fauna of the Thames Valley which it has yielded to our researches. The section was first discovered by one of us in company with Dr. F. Corner, F.G.S., in April, 1899, and since that date we have systematically studied it and its fossil contents.

The following beds were exposed :—

	ft.	in.
1. Stiff brown loam, with many pebbles in the upper portion.		
In thickness from	8	10
2. Finely laminated clays, of a blue, brown, yellow, or mottled colour. This series contained a few shells. ..	About	3 6
3. Laminated brown clay " <i>Anodon</i> bed"	1	6

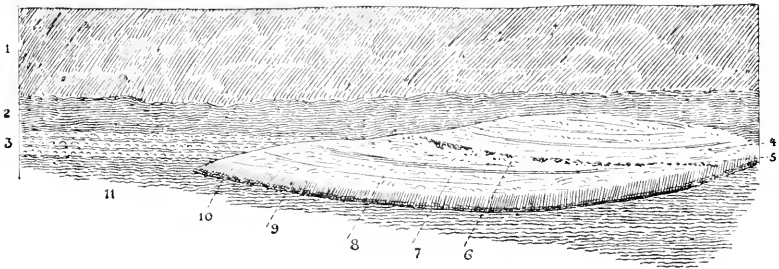


Fig. 1. Section in Pit at Orsett Road, Grays. (For explanation see text).

4. Shell-beds, consisting of fine sand crowded with fluvialite and land shells and with many bones and teeth of small vertebrata; the whole interstratified with thin beds of gravel. In thickness from nothing to	2	6
5. Thin seam of gravel dipping S. at an angle of 9°	4	
6. } Shell and <i>Unio</i> beds, consisting of similar materials to those		
7. } constituting No. 4. Nothing to	3	0
8. }		
9. Brown clay. Nothing to	6	

	ft.	in.
10. Blue clay, with shell of <i>Anodon</i> , etc., together with the remains of mosses and other plants. The lower portion of this bed contained a great deal of limonite. Nothing to ..		9
11. Finely laminated, fissile, and mottled clays, containing bones of <i>Cervus</i> , <i>Bos</i> , etc., and shells of <i>Anodon</i> and <i>Unio</i> in places. Many nodules or concretions of "race" occur throughout this division. The bottom portion was saturated with water. About		12 0 seen

The upper surface of the Laminated Clay series (No. 11) and the under surface of the Blue Clay (No. 10) are seen to be polished and striated—the striae running to the N.E. by E. This feature evidently owes its origin to movement between the two beds, which, of course, means slipping.

The fine sections formerly exposed in the great brickyards which extended from Grays to Little Thurrock appear to have been first described in detail by Prof. J. Morris in 1836 although Buckland, Parkinson, and Trimmer undoubtedly had some knowledge of them. Only one of these fine sections now remains, viz., that at the Globe pit, but as these exposures have so often been described, we have contented ourselves by giving full reference to the literature concerning them in our Bibliography of important works on the district.

V. PALÆONTOLOGY.

Grays Thurrock is famous for the fine series of organic remains that have been obtained from the various sections formerly exhibited in the district. In the present part of the paper we have given a full list of the fossils and have described the remains upon which the new records are based.

MAMMALIA.

(a.) *List of Species—*

- Homo sapiens** (Implements)
- Macacus pliocenus**, Owen.
- Canis lupus**, Linn.
- ,, **vulpes**, Linn.
- Felis catus**, Linn.
- ,, **leo**, Linn.
- Hyæna crocuta**, Erxl.
- Lutra vulgaris**, Erxl.

- Ursus arctos**, Linn.
 „ **ferox**, Richd.
Bison bonasus var. **priscus**, Boj.
Bos taurus var. **primigenius**, Boj.
Cervus elaphus, Linn.
 „ **giganteus**, Blum.
Capreolus caprea, Gray.
Elephas antiquus, Falc.
 „ **primigenius**, Blum.
Rhinoceros antiquitatis, Blum.
 „ **leptorhinus**, Owen.
 „ **megarhinus**, Christol.
Sus scrofa, Linn.
Equus caballus, Linn.
Hippopotamus amphibius, Linn.
Mus sylvaticus, Linn.
Microtus agrestis, Linn.
 „ **ratticeps**, Blas.
 „ **amphibius**, Linn.
 „ (**Evotomys**) **glareolus**, Schreb.
Castor fiber, Linn.
Sorex vulgaris, Linn.

(b.) *Notes on the Species.*

Microtus agrestis. Among the Rodentian remains obtained from the Orsett Road Section are three second upper molars, several mandibular rami, including one in Mr. J. P. Johnson's collection, and numerous detached teeth which are referred to *M. agrestis*. The only constant dental character which distinguishes the British Field-vole from the Continental *M. arvalis* is the development of three inner angles in the second upper cheek tooth of the former instead of two in the latter. This accessory angle of *M. agrestis* is very small. In dealing with detached teeth its possession also serves to distinguish *M. agrestis* from *M. ratticeps*. The three teeth from Grays agree with the British Field-vole in this respect and also in size. We, therefore, have no hesitation in placing them with this species.

With regard to the mandibular rami and the detached teeth other than the second upper molar, the evidence is not so positive. The former plainly belong, from the pattern of the anterior molars, to either *M. agrestis* or *M. arvalis*, while some of

the upper teeth may also represent *M. ratticeps*. Yet seeing that *M. arvalis* is unknown at present from Grays by any indubitable specimen, and that *M. ratticeps* is very rare at this locality, we feel justified in referring these remains provisionally at all events to *M. agrestis*. The species has not previously been positively recorded from the Pleistocene of the Thames Valley. It is known, however, from other Pleistocene deposits.

Microtus ratticeps. We have in our collection from Grays three specimens of the third upper molar of a small vole. They present four well developed external angles such as characterize the corresponding tooth in the figure of the dentition of the typical *M. ratticeps* given by Prof. Blasius (II., p. 366, fig. 201). Although this tooth is variable in *M. ratticeps*, sometimes agreeing with *M. arvalis* and *M. agrestis* in having only three external angles, still we know of no vole whose variations agree in this respect with the typical form *M. ratticeps*. We, therefore, have little doubt of the correctness of referring these specimens to this form, and it is to be hoped that the still more characteristic anterior lower molar will be found at Grays. The species is known from the Pleistocene of Crayford and Erith and from other strata of a similar age.

Microtus amphibius. The remains referred to *M. amphibius* from the Orsett Road Section include a left ramus with the anterior and second molars and numerous detached teeth. They all agree with recent examples in the pattern of the crowns. In size, however, they differ; nearly all the examples that we have obtained from Grays are small, approaching *M. intermedius* in this respect, but as none of the teeth are fanged it is clear that they represent a local and small race of *M. amphibius*.

The Water-vole has long been known from the deposits of Grays and other places in the Thames Valley, and has likewise been obtained from many other Pleistocene beds. It is somewhat doubtful whether it occurs in the Norfolk Forest Bed.

Microtus (Evotomys) glareolus. A first upper cheek tooth of the left side from the Orsett Road Section, in our possession, agrees with the corresponding teeth of recent examples of the Bank-vole in pattern, size, and the possession of

fangs. The latter, since the present specimen belonged to a young individual, are small and only partly developed. Mr. J. P. Johnson has in his collection two teeth of *M. glareolus* which he has kindly allowed us to examine. Both specimens are first left lower molars and both have two well developed fangs, the anterior of which are the larger. They each present four outer and four inner angles or prisms differing, therefore, from Blasius' typical form which has five internal angles. They thus more nearly resemble the form figured by Blasius (op. cit.) in his figure 180 in which the fifth or anterior inner prism is merged in the one just behind.

M. glareolus has not previously been recorded from the Drift of the Thames Valley, but is known from other Pleistocene beds. It has also been found in the Norfolk Forest Bed.

Mus sylvaticus. Mr. J. P. Johnson has obtained from the Orsett Road Section a small fragment of a right rodentian ramus carrying the anterior molar. The latter agrees in size with the corresponding tooth of *M. sylvaticus*, and also in the number and arrangement of the tubercles. It differs likewise from *M. lewisii* in having a small anterior accessory cusp, which in the latter species is absent. The specimen is, therefore, placed with *M. sylvaticus* without doubt.

This species forms a new record for the Pleistocene deposits of the Thames Valley. It has been obtained from the Ightham Ossiferous Fissures and also from the Norfolk Forest Bed.

Sorex vulgaris. Remains of the Shrew have long been known from Grays. Three specimens presented by John Brown, of Stanway, are in the British Museum (Natural History). The specimens from the Orsett Road Section have been carefully compared with recent skeletons of *Sorex vulgaris*, and agreeing as they do in every respect with the Common Shrew we have little hesitation in referring them to this species. This form has been met with in other beds of Pleistocene age and also in the Norfolk Forest Bed.

AVES.

(a.) *List of Species.*

Anser cinereus, Meyer.

Cygnus musicus, Bechstein.

Phalacrocorax carbo, Linné.

(b.) Notes on Species.

Anser cinereus. This species is represented by a left femur preserved in the British Museum. The genus *Anser* is known from the "Forest Bed" series of West Runton. Bones of the goose have likewise been obtained from the Pleistocene deposits of Ilford and Crayford in the Thames Valley.

Cygnus musicus. In the British Museum is preserved the "distal portion of a tibio-tarsus not improbably belonging to this species." Many years ago Sir Richard Owen described and figured this specimen, and he presented it to the national collection. The proximal end of a radius in all probability referable to this species is in the same collection.

Phalacrocorax carbo. A left ulna bearing the number 36633 in the British Museum Catalogue is therein referred to *Anser cinereus* (p. 103). The specimen, however, bears the label *P. carbo*, and believing this to be the correct reference we have listed it as such. The Cormorant is known from the "Forest Bed" series of West Runton.

REPTILIA.

Tropidonatus natrix. Among the fossils which we have obtained from the Orsett Road Section is a thoracic vertebra of a reptile. This specimen agrees very closely with those of the recent Grass-snake to which species we accordingly refer it, but we avoid minutely describing it until we have made a more extended comparison with recent examples both of this species and the Viper. The Grass-snake is known from the "Forest Bed" series and from the Ightham Fissure. It has not, however, been previously recorded from the Pleistocene deposits of the Thames Valley.

AMPHIBIA.

(a.) List of Species.

Rana temporaria, Linné.

Bufo vulgaris, Linné.

(b.) Notes on Species.

Rana temporaria. We have obtained from the Orsett Road Section a fairly large series of bones representing the Amphibia, many of which are referable to *Rana*. Among the latter a left ilium and the distal portions of three male humeri,

are referred to *Rana temporaria* since they agree in every respect with the corresponding bones of that species. We have also the distal portion of a female humerus, which, from its size, may possibly be referable to *Rana esculenta*.

Bufo vulgaris. A left scapula in Mr. Johnson's collection from Grays agrees so closely with that of the recent Toad in the character of its curvature, proportions and processes, that we have no hesitation in referring it to this species. We have seen no other bones from Grays which could unquestionably be said to represent *Bufo*, but some of those referred to *Rana* may probably belong to this genus. Both the frog and the toad are known from the "Forest Bed," and also from Pleistocene strata. The toad is, however, a new record for the Drift of the Thames Valley.

PISCES.

By E. T. NEWTON, F.R.S., F.G.S.

The search for small vertebrate remains in British Pleistocene deposits has, within the last few years, made known to us many species of Mammals and Birds in the fossil state in Britain, which were previously only recognized as living species. The remains of fishes from deposits of this age, however, have been but seldom met with, and any discoveries in this direction are worthy of being placed on record. Messrs. Hinton and Kennard have for some time past been searching the beds at Grays Thurrock, and by means of careful sifting have obtained a number of bones and teeth of small vertebrata, among which are a goodly series of fish teeth and bones, all very small, but at the same time sufficiently perfect in many instances to allow of specific determination.

Acerina vulgaris ? Cuvier (Ruff). Twelve otoliths varying in size from 2.5 mm. to 5.0 mm. in length are provisionally included in this species. The outline and form of the sulcus agree most nearly with what is found in the otoliths of the Ruff; but as the Grays specimens are all somewhat denuded their points and serrations are not so sharp as in the recent fish, and consequently there may be some little doubt as to their specific identity with the Ruff. These otoliths correspond very closely with the one from the Norfolk Forest Bed (Pliocene) which was likewise referred to this species.

Esox lucius, Linn. (Pike). A number of teeth of various sizes, the largest measuring 13.0 mm. or more in length, and having the compressed crown with sharp edges, so characteristic of the pike, are believed to represent this species at Grays. The same form has long been known to occur at Ilford and in beds of similar age elsewhere, as well as in the Norfolk Forest Bed.

Leuciscus. Several pharyngeal bones and numerous isolated teeth of Cyprinoid fishes are without doubt referable to this genus; but while some of the specimens can be definitely assigned to species, most of the isolated teeth can only be generically named or at best placed in species provisionally.

Leuciscus rutilus, Linn. (Roach). Two pharyngeal bones, each with a single row of teeth and these of the forms found in the Roach, supply as good evidence as could be expected of the presence of this species at Grays; and it is almost certain that the greater number of the isolated teeth also belong to this form, which has been recognised in other British Pleistocene beds and also in the Norfolk Forest Bed.

Leuciscus vulgaris, Flem. (Dace). Four small pharyngeal bones, each with two rows of teeth, which are comparatively long and with somewhat hooked extremities, are believed to be rightly placed with *L. vulgaris*, and certain of the isolated teeth probably belong here also. I am not aware that this species has before been found in Pleistocene beds.

Leuciscus erythrophthalmus, Linn. (Rudd). A single isolated crown, which is long, slender, curved and strongly crenulated, is the only specimen which can at present be placed in this species. Evidence of the Rudd was found in the Norfolk Forest Bed and it has also been met with in Pleistocene beds at Hitchin.

Anguilla? anguilla? Linn. (Eel). A single imperfect vertebra has the neural arch strongly developed and forming a bony tube as long as the centrum itself. A similar condition of the neural arch is found in certain of the vertebræ of the common Eel, and it seems probable that our specimen represents that species which has not hitherto been recognized as a fossil. It may seem hazardous to record a species, even with doubt, upon such slender evidence; but I feel justified in so doing in order that attention may be directed to the possible occurrence and so further evidence be sought for.

*Fishes from the Pleistocene of Grays Thurrock.***Acerina vulgaris?** Cuvier.**Esox lucius,** Linn.**Leuciscus rutilus,** Linn.,, **vulgaris,** Flem.,, **erythrophthalmus?** Linn.**Anguilla ? anguilla ?** Linn.

All these fishes are characteristically freshwater species which are living at the present day in the rivers and lakes of England and Europe.

MOLLUSCA.

In 1897 after a careful examination of all existent material and a revision of the previously published lists, Mr. B. B. Woodward and one of us were able to list 49 species from the Middle Terrace, but of these no less than 18 were unrepresented in any collection, whilst several other records were rejected for various reasons. Of these rejected species only one has rewarded our researches, viz., *Clausilia biplicata*, first recorded by S. V. Wood. There can be but little doubt that the record of *Balea perversa* is an error, as already suggested by the same writer, for numerous tops of *Clausilia* have been found. We are now able to verify seven records hitherto unrepresented by extant specimens. The remaining unverified records are left for what they are worth, and of these no less than nine are on the authority of S. V. Wood. This collection is now in the Norwich Museum, and it has been examined by one of us, and these species are not to be found there. They are all known from other Pleistocene deposits so that there is no inherent improbability in their occurrence, but we venture to think that no reliance can be placed on them. We have found forty-five species, of which ten are new records. There are four species known from Grays which we failed to find, whilst twelve recorded forms are still absent.

Agriolimax agrestis, Linn. This form is represented by numerous examples not only in our collection but also in the Natural History Museum. These latter examples were collected by Mr. Pickering and presented by him to the Geologists

Association, by whom they were transferred to the National Collection. It is known from the Pleistocene of the Thames Valley at Ilford and Crayford.

Limax maximus, Linn. Two examples, one of which has unfortunately been lost. This is a new record for the Pleistocene of the Thames Valley, and it is only known in a fossil state from the Ightham Fissure.

Vitrea nitidula, Drap., recorded by S. V. Wood. No examples known.

Vitrea radiatula, Ald. On the authority of S. V. Wood.

Vitrea nitida, Müll. More than a dozen examples found, most of which are immature.

Arion ater, Linn. Several calcareous granules occurred which after a careful comparison with recent specimens we have referred to this well-known slug. In this country it is only known fossil from the Pleistocene of Ilford and the Holocene of Newbury, but there is no doubt that it does occur in other deposits as it is so easily overlooked or mistaken for a fragment of quartz.

Pyramidula rotundata, Müll. Only one example, and that immature, was found, but we are thus enabled to confirm S. V. Wood's record.

Pyramidula ruderata, Stud. Recorded by S. V. Wood who noted that it was common at this locality, but we have failed to obtain any examples. It is known from Clacton, Copford and Barnwell.

Punctum pygmæum, Drap. Recorded by S. V. Wood.

Vallonia pulchella, Müll. Common.

Hygromia hispida, Linn. Common. As usual with this polymorphic species there is considerable variation, several examples being of the form named *concinna* by J. Gwyn Jeffreys which is, however, the Linnean type of the species.

Helicigona arbustorum, Linn. Several fragments, undoubtedly belonging to this species, enable us to confirm S. V. Wood's record.

Helix nemoralis, Linn. Two imperfect examples and numerous fragments.

Helicella virgata, Da Cost. Four examples. The occurrence of this species is of great interest, as hitherto it is only represented from the Pleistocene of the Thames Valley by a single example found at Ilford by Dr. Frank Corner, and now in the Natural History Museum. Elsewhere it was common at Barnwell, and it has been found in several rainwashes of uncertain age, probably very modern, if not post-Roman.

Helicella itala, Linn. Not found by us, but a single example was found by W. J. Lewis Abbott, F.G.S., in the pit belonging to the Tunnel Cement Works Company. It differs markedly from typical examples of this species, but it can only be considered a variety. Several examples of this variety have lately been obtained from Ilford by J. P. Johnson and G. White (see ESSEX NAT., vol. xi., p. 159).

Helicella caperata, Mont. Three examples of this abundant Pleistocene shell.

Cochlicopa lubrica, Müll. One perfect and two broken specimens.

Pupa muscorum, Linn. Not common. This is noteworthy as it is usually one of the most abundant land shells in Pleistocene deposits.

Vertigo antivertigo, Drap. Five examples. This species was recorded by S. V. Wood, but hitherto no examples were known.

Vertigo substriata, Jeff. Recorded by A. Tylor on the authority of A. Bell.

Vertigo pusilla, Müll. Recorded by S. V. Wood.

Clausilia laminata. Mont. Several fragments. It has hitherto been unrecorded from Grays. It is known from the Pleistocene of Ilford, Clacton, Copford and Ightham, whilst it is abundant in many Holocene beds.

Clausilia biplicata, Mont. Several imperfect examples. Though originally listed by S. V. Wood this record has hitherto been rejected since the species was unknown in a fossil state in this country (there being no examples of it in the Wood

collection). Lately, however, it has been found in a Holocene rainwash at Reigate, and now that it has been proved to occur in the Pleistocene it must be considered an ancient inhabitant and not a recent introduction, a conclusion which is in accordance with its discontinuous distribution in England.

Clausilia bidentata, Ström. Several fragments. Hitherto unrecorded from Grays.

Succinea putris, Linn. Recorded by the late Professor John Morris.

Succinea elegans, Risso. Several examples. A new record for Grays.

Carychium minimum, Müll. Two imperfect examples, thus confirming the record of this species by Prof. Morris. In the Pleistocene of the Thames Valley it is only known from N.E. London, the Admiralty section and Ilford.

Ancylus fluviatilis, Müll. Common.

Velletia lacustris, Müll. Common. (This species is generally known as *V. lacustris*, Linn., but it is not Linné's species which is the shell known as *Ancylus fluviatilis*, Müll. Hence to avoid confusion it is better to ignore Linné's name).

Limnæa auricularia, Linn. A single example.

Limnæa pereger, Müll. Common.

Limnæa palustris, Müll. Common.

Limnæa truncatula, Müll. Common.

Limnæa stagnalis, Linn. A single apical fragment only. Recorded by S. W. Wood, but hitherto no example known.

Planorbis corneus, Linn. Recorded by S. V. Wood.

Planorbis albus, Müll. Common.

Planorbis glaber, Jeff. Two examples, thus enabling us to confirm S. V. Wood's record.

Planorbis nautilus, Linn. Recorded by S. V. Wood.

Planorbis carinatus, Müll. Listed by Prof. Morris. Perhaps an error for the next species.

Planorbis marginatus, Drap. Several examples.

Planorbis vortex, Linn. One example of this hitherto unrecorded species. It is a rare form in any Pleistocene deposit.

Planorbis spirorbis, Linn. Several examples.

Planorbis contortus. Linn. An imperfect example. Recorded by S. V. Wood, but no examples known.

Planorbis fontanus, Lightfoot. Two examples, one of which has been lost. This is a new record for Grays. It is known from the Pleistocene of Westminster, Clacton, Copford and Barnwell.

Planorbis lineatus, Walk. Recorded by S. V. Wood; perhaps an error for *P. fontanus*.

Paludestrina ventrosa, Mont. An abundant form. This is the more remarkable as at the present day it is a brackish water form, and there is no other palæontological evidence of estuarine conditions at Grays.

Paludestrina marginata, Mich. Several examples of this species which is now quite extinct in this country though still living on the Continent, in S.W. France, N.E. France and Belgium. Though known from several deposits in this country of Pleistocene age it is not known from any newer beds.

Bythinia tentaculata, Linn. Abundant.

Bythinia leachii, Shepp. Not found by us, though examples are in the Natural History Museum from Grays.

Valvata piscinalis, Müll. The most abundant species. Numerous examples of the form known as var. *antiqua*, Sow, were found as well as every intermediate state between it and var. *depressa*, Pfr. Though the former variety is on the Continent considered a good species under the name of *V. contorta*, Menke, in our opinion it can only be considered an extreme variety of the polymorphic species *V. piscinalis*. We have never seen recent British examples of var. *antiqua* though according to Jordan' it still lives in Southern Scandinavia, Jutland, Holland, Germany and N. France.

Valvata cristata, Müll. Seven examples.

Unio littoralis, Lam. Not found by us. Examples in the Natural History Museum.

Unio pictorum, Linn. Not found by us. Examples are preserved in the Prestwich collection in the Natural History Museum.

Unio tumidus, Retz. Abundant, but most of the specimens were small, and owing to their condition it was only with extreme difficulty that perfect examples were obtained.

Anodonta cygnea, Linn. Numerous broken examples in the clay.

Corbicula fluminalis, Müll. Very common, but though examples were obtained ranging from the fry to the adult none of the specimens can compare in point of size with Crayford examples. A pair of valves obtained from the base of the shell bed still retained traces of their coloration.

Sphærium corneum, Linn. Common. Most of the examples were intermediate between typical *corneum* and var. *menanum*.

Pisidium amnicum. Abundant. Many of the examples were very large and much inflated, a variation which is apparently confined to Grays. Numerous specimens of the variety *dambialis* were found. This variety is well marked, resembling in shape *P. fontinale*, but it is of course very much larger. This variety was first found at Crayford, and on examples being submitted to Dr. O. Böettger, he identified them as var. *dambialis*. We have not seen recent British examples, though it is living on the Continent.

Pisidium astartoides, Sandb. Very common. This is a well marked species and though strongly sulcate specimens of *P. amnicum* may somewhat approach it, yet its shape and the sulcate umbo at once distinguish it.

Pisidium pusillum, Gmel. Recorded by S. V. Wood.

Pisidium fontinale, Drap. Very abundant.

There is now a total of sixty-one species known or recorded from Grays: forty-nine being from existing examples and twelve on authority, a longer list, with the exception of Ilford, than from any other Pleistocene deposit in the Thames Valley.

OSTRACODA.

The first account of the Ostracoda occurring in the Pleistocene deposits of Grays was given by Prof. T. Rupert Jones in 1850. (8a) They were subsequently described in the Memoirs of the Palæontographical Society and the following species are recorded.

- Cypris browniana, var. tumidus, Jones.
- Illoocypris gibba, Rahmdohr.
- Cyprideis torosa, Jones.
- Potamocypris trigonalis, var. lævis, Jones.
- Herpetocypris reptans, Baird.
- Candona candida, Müll.

For descriptions and notes of these specimens we must refer the reader to the memoirs above cited.

PLANTÆ.

For our knowledge of the Pleistocene Flora of Grays we are indebted to the labours of Mr. Clement Reid, F.R.S. His determinations are based upon specimens in the collection of the late Sir Joseph Prestwich, which specimens had previously been partly identified by Prof. Oswald Heer. The species listed by Mr. Reid in his paper are (67a)

- Ranunculus repens, Linné.
- Rubus fruticosus, Linné.
- Rosa canina, Linné.
- Hedera helix, Linné.
- Ulmus ?
- Alnus glutinosa, Gart.
- Quercus robur, Linné, var. sessiliflora.
- Corylus avellana ? Linné.
- Populus cf. canescens.
- Salix, sp.
- Potamogeton.
- Cyperus ?
- Phragmites ?
- Grass nodes.
- Equisetum.

Mr. Reid says of these species, "The plants occur associated with, or below the remains of Mammoth and *Corbicula fluminalis*. They point distinctly to a temperate climate and

mild winters, for the ivy is extremely sensitive to winter cold. Both the character of the flora and the position of the deposit suggest correlation with the temperate plant beds at Hoxne, which lie between the Boulder Clay and the deposit with Arctic species. The Ivy and the Poplar have not previously been recorded as British fossils."

We sent some samples of the Blue Clay (No. 10) of the Orsett Road Section to Mr. C. Reid who says of these that they yielded remains of mosses, but of indeterminable species. It is of interest to note Mr. Reid's conclusion as to the character of the climate of the Brickearth stage as it exactly corresponds with our own, arrived at from a study of the lithological and the other palæontological characters of the beds.

PALÆONTOLOGICAL SUMMARY OF THE PLEISTOCENE DEPOSITS OF GRAYS.

				No. of Species.
Mammalia	...	...	.	30
Aves	...	...	...	3
Reptilia	.	...	..	1
Amphibia	...	...	.	2
Pisces	...	.	...	6
Mollusca	...	...	...	61
Ostracoda	...	..	...	6
Plantæ	..	...	...	16
				<hr/>
	Total	..	...	125
				<hr/>

VI. PHYSIOGRAPHY.

The physiography of the Grays Thurrock Area presents certain features of great interest, which features are likewise of a somewhat complicated nature. In the present section of this communication we propose to describe one of the physiographical features of the eastern portion of the district, and this description will embody the results of our observations on the structure and formation of several valleys which intersect and diversify the plate as formed by the High Terrace Drift.

The valleys referred to may be likened to wide, shallow grooves of about thirty feet in depth, varying from a quarter to half a mile in breadth and about three-fourths of a mile to one mile

in length. Some are smaller than this, but none are larger. One may be seen between Palmer's Avenue and Sockett's Heath trending in a general east and west direction. Another has its head situate about one furlong to the west of the Small-pox Hospital and trends, roughly speaking, north and south. The other valleys which occur in this district all follow either the one or the other of the directions indicated above. They are wholly confined to that portion of the district in which the High Terrace Gravel rests directly upon the Chalk or in which only the Thanet Sand intervenes between the former and the latter. In the northern portion of the eastern tract, where the more argillaceous Woolwich Beds and the London Clay come on under the gravel, the valleys are absent.

That they do not owe their origin to fluvial erosion operating since the deposition of the High Terrace Drift is evident from the fact that they do not cut through the gravel, which on the contrary invests the valley bottoms as completely as it does the high ground round about. This objection also operates against any agent of subærial denudation which involves the mechanical removal of detritus from off the surface. It seems inconceivable that the valleys could have been fashioned in the Thanet Sands before the deposition of the drift, for in that case they would either have been filled up and so would have given but slight evidence of their existence at the surface, or else they would have been effaced by the ordinary erosive action of the river.

The first section that threw any light upon the development of these valleys was one exposed in a gravel pit at Sockett's Heath. Here the regularly stratified gravels described in Section III. of this paper were seen, on the western face of the pit, to have been bent down inwards from the north and from the south so as to form a syncline of some fourteen or sixteen feet in depth and about fifty feet in width. This trough was filled up with confused and unstratified gravel resting upon equally confused and irregular sand and loam, the whole of this infilling material possessing the appearance of having been tumbled in from above (Fig. 2). All the stones as they approached the centre or base of the syncline were seen to become perfectly vertical, which plainly showed that it was a downward movement that had placed them in their present position. The axis

of this disturbance is coincident with that of the east and west valley to the south of Sockett's Heath mentioned above. There can hardly be any question as to the cause of the disturbance affecting this gravel. The synclinal folding of the lower part, the irregular character of the detritus which fills up the hollow thus formed, and the vertical position of the constituent stones of the latter seem to admit of but one explanation. All these

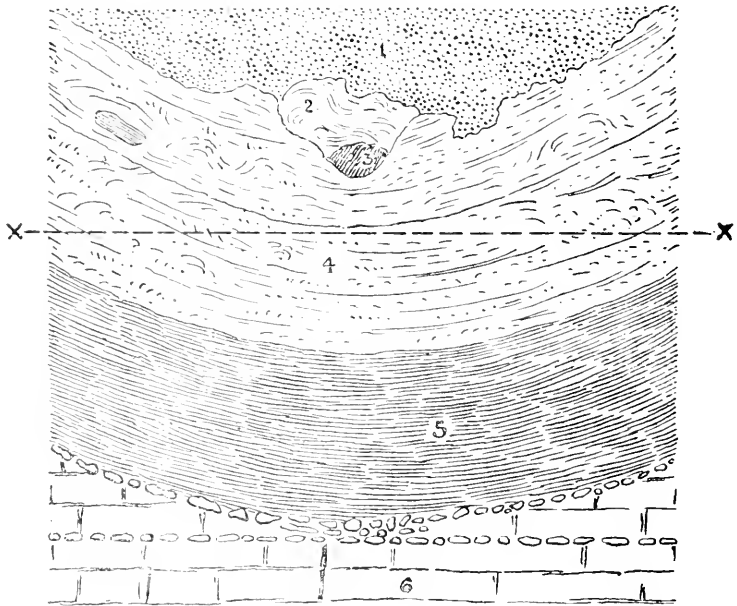


Fig. 2. Section in Sockett's Heath Gravel Pit. 1, Irregular Gravel; 2, Unstratified Sand; 3, Unstratified Loam; 4, Regularly Stratified Sand and Gravel, false bedding in places; 5, Thanet Sand (full thickness not shown) X-X. The floor of pit, below which the drawing is diagrammatic.

characters were brought about as the result of the underground dissolution of the Chalk by water charged with carbonic oxide and organic acids acting along a more or less definite line of weakness. This section simply supplies proof of the existence of a process operating in the district whereby the surface of the Chalk is dissolved away, the result of which is that furrows and grooves are eroded in it into which the superjacent strata gradu-

ally descend. The next section to be noticed goes considerably further than this since it shows that in this process lies the true secret of the origin of the valleys.

Just to the west of Belmont Castle a small north and south valley occurs, the floor of which is at an elevation of from ninety to one hundred feet O.D. Its southern extremity is truncated by the northern face of the Chalk-quarry of the Grays Portland Cement Works which thus affords a good transverse section through it. The surface of the Chalk has been eroded by carbonated water so as to form a groove into which the Thanet Sand and High Terrace Gravel have subsided. Here and there where some portions of the Chalk have offered more resistance to the solvent action than the main bulk small irregularly

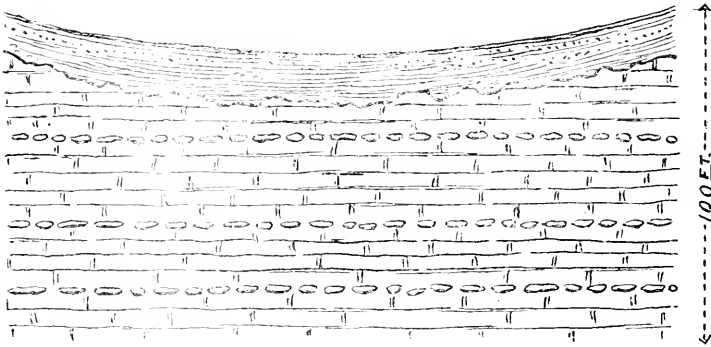


Fig. 3. Section across Valley S.W. of Belmont Castle.

rounded bosses stick up and protrude into the overlying strata. The axis of this furrow is coincident with that of the valley, both in direction and in longitudinal position, while the general contour of the furrow and that of the valley floor as seen in transverse section are parallel (Fig. 3).

The section afforded by the northern face of the quarry west of Milwood Lane gives similar evidence of the erosion of the surface of the Chalk into grooves in this district, but the relation of the surface contour to that of the groove is not so apparent here as in the last instance as the ground has been subsequently modified by other subaërial denuding agents to a considerable extent.

There is one valley to which it is necessary to refer in some detail, namely, that occurring to the west of Hangman's Wood. Its direction is north and south, its southern end opening out into the lower ground formed by the Brickearth and Alluvium bordering the Thames. Its early origin is somewhat obscure owing to the fact that it has been much modified by the Thames in Pleistocene times. This modification has tended to increase both its width and its depth, but more especially the latter, the result being that the High Terrace Gravel which formed its floor has been swept out together with part of the underlying Thanet Sand. Slightly to the west of the mouth of this valley a good section is to be seen exposed in the "Globe" brickfield, near Little Thurrock. This section shows how this deepening was accomplished. Here the Thanet Sand has had its surface

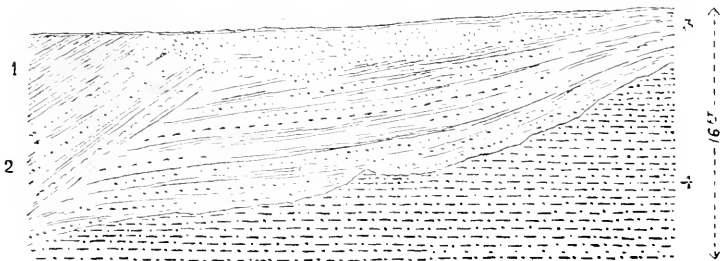


Fig. 4. Section in the "Globe Works" Pit east of Grays. 1, Brickearth; 2, Brickearth and Gravel Interstratified (Middle Terrace Series); 3, Gravel and Sand washed down from Valley to the North (High Terrace Series derived); 4, Thanet Sand.

eroded by the mechanical process of gravel being swept over it, and upon this eroded surface a mixture of well stratified detritus derived from the High Terrace Gravel and the Thanet Sand reposes, the dip of which is to the south the angle of inclination being similar to that of the floor of the valley. Upon this rearranged material the Middle Terrace Brickearths have been laid. It is, therefore, clear that the deepening and widening of this valley took place during the time which ensued between the end of the High Terrace stage and the deposition of the earliest sediments of the Middle Terrace (Fig. 4).

From these facts it is safe, in our opinion, to regard the valleys referred to as being the result of the solvent action of

acidic water upon the Chalk of the district. It is evident, however, that a process which in other districts has produced, but comparatively infinitesimal results must have been favoured in this neighbourhood by conditions which have greatly accelerated and regulated its working. Sir Joseph Prestwich in his masterly essay upon the origin of the Sand and Gravel-pipes in the Chalk (9) was the first to attack the subject of the conditions which must necessarily govern their formation. He maintained that pipes were not only the result of the chemical dissolution of the Chalk, but, moreover, under existing conditions in the great majority of instances they could not now be formed. He argued that the existence of a higher level of saturation was essential to the formation of pipes, and this increase in height was of a secondary nature, depending not so much upon the elevation of the land above the sea as upon the relative permeability of the Chalk and its superincumbent strata together with the unbroken continuity of the latter across broad stretches of country. Further he held that the pipes did not necessarily imply the existence of fissures or joints in the Chalk, but that such occurrences would retard rather than accelerate their formation. In the case before us, however, Prestwich's conclusions cannot be applied in their totality, but rather require some little modification.

It is clear that there is one important distinction between the dissolution of the Chalk into pipes on the one hand and the formation of valleys by the same means on the other. In the one case the conditions rendering the Chalk liable to the attacks of solvents are extremely local and may be but slight, but in the case of the valleys the conditions are not local, in the sense of the term applied to the pipes, but on the contrary extend over a considerable horizontal distance, giving rise to definite lines or planes of weakness. The nature of these lines of weakness, which constitute the valley axes, is shown by the geotectonic geology of the district.

The Chalk of the Grays Thurrock Area occurs as an inlier brought up by a small anticlinal fold, later in date than the great Wealden and London Basin movements as is indicated by the following data. At Stifford it is common with the Lower London Tertiaries dips to the north at an angle of about 10° , and thus is soon lost beneath the London Clay. But in

tracing the beds to the south across their outcrop this northerly dip gradually ceases and the strata become horizontal. Soon after the Thames is reached, however, the beds become again inclined, but this time to the south, so that in the quarries at Greenhithe in Kent the Chalk is seen dipping in this direction at an angle of from 2° to 3° (Fig. 5, p. 367).

Disturbance of a similar, if not the same, date has resulted in faulting the Cretaceous and Tertiary rocks a little up the Thames Valley from the Grays district. One of these faults has been traced as far east as Erith where it is lost under the Alluvium. The tension resulting from the crumpling has not been great enough to produce faults in the district under consideration so far as is known at present, but it has been great enough to open fissures in the Chalk. These fissures are most abundant in that portion of the Chalk which forms the crest of the little anticline, the tension being naturally greatest there, and a good instance of their development in this part of the district was mentioned by Mr. F. C. J. Spurrell in the Report of an Excursion of the Geologists' Association to Grays (64)

The next point to be considered does not at first sight have much connection with the subject under discussion, namely, the principle governing the formation of terraces. Assume that we have a country whose elevation above the sea may be represented by the symbol **A**, and that the rivers have adjusted their courses to the base level of our suppositious region, *i.e.*, they are graded. It is likely that the rivers are depositing sediments at this stage; if slight subsidence of the area goes on they will certainly do so. Suppose that the country has its height above the sea **A** augmented by a further rise of 50 feet. What happens? The rivers at once cut through their old beds and commence to excavate the valley 50 feet deeper with the object of keeping their channels graded. The elevation of the land and the erosion of the valleys by the rivers goes on simultaneously. The ultimate result of this is that the deposits laid down by the river when the land was at **A**, form, when the succeeding period of elevation has ceased, a "terrace" 50 feet above the surface of the river. This is the only way in which river terraces could be formed at the present day, and there is certainly nothing illogical in applying the same principle to the terraces and raised beaches of Pleistocene age. The average

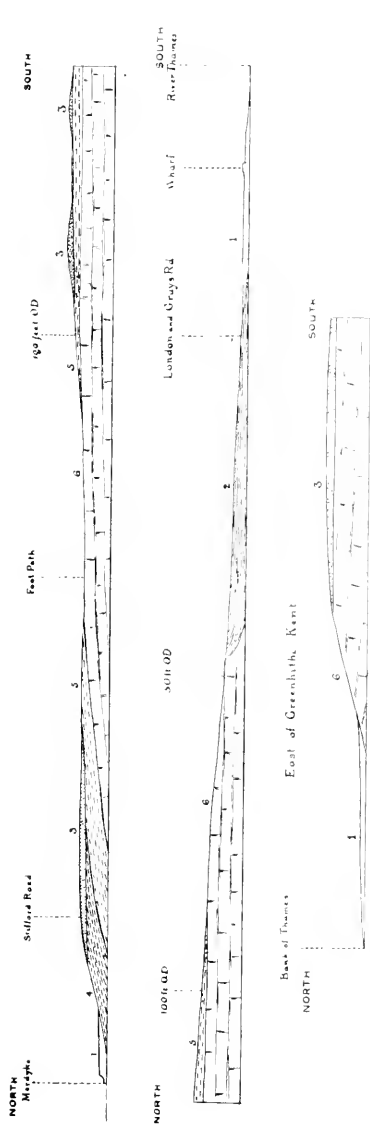


Fig. 5 Section from the Mardyke, across the Thames to Greenhithe

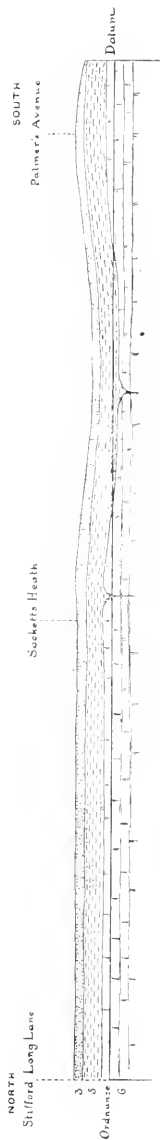


Fig. 6. Section across Valley north of Palmer's Avenue, Gray's.

Index to above:—1, Holocene alluvium. 2, Middle Terrace Deposits. 3, High Terrace Deposits. 4, Woolwich and Reading Beds. 5, Thanet Sands. 6, Chalk

In these two drawings the vertical scale is twice the horizontal.

height of the High Terrace is about 100 feet higher than that of the river of to-day, a relation which is exhibited from the eastern portion of Essex up the valley as far as Reading if not further. Very commonly also we have a Raised Beach at the same relative level occurring on different parts of the coast which we would correlate with the High Terrace.

It follows from this that in High Terrace times the land stood at an elevation 100 feet lower in relation to the level of the sea than at the present time. This being the case it means a corresponding general rise of the saturation plane in High Terrace times since it is evident that strata now 100 feet above that plane were then just beneath it.

Prestwich objected to the view that fissures favourably influenced the dissolution of the Chalk on the ground that acidic water would pass so freely through them that very little solvent action would be carried on upon their sides and edges. But this difficulty is removed when we consider the physical conditions of the High Terrace stage in the light of recent scientific advance. It is now more than probable that the view expressed above as to the formation of terraces is correct and this being so it is clear that the fissures in the Chalk of Grays were in High Terrace times completely immersed below the saturation plane. It is evident that such fissures, granted favourable conditions, will always form the vulnerable portions of a rock which will most readily yield to denuding agents whether they be of a mechanical or a chemical nature. They constitute, together with joints, natural lines of weakness and greatly assist in the disintegration of rock-masses. Mr. Rutley's experiments in the dissolution of blocks of chalk with weak acids, described by him in his paper on "The Dwindling and Disappearance of Limestones" (66), fully corroborate this view as applied in the present connection.

The solvent will most readily attack the edges afforded by the junction of the walls of the fissures with the upper surface of the Chalk, because there it will have the greatest superficial area to act upon, while the strains, of which the fissures are resultant, will have increased this large working surface by the partial shattering or splitting of the surrounding rock. The dissolution will, therefore, tend to widen the upper part of the fissure by gradually rounding off the edges in such a manner that a shallow

groove of considerable width is formed and into this groove the superincumbent and elastic strata slowly descend, and thus a valley is gradually formed which marks the line of fissure.

It has been previously said that the Chalk inlier of Grays Thurrock really forms part of a small anticline. On the summit of the dome the fissures are probably widest, but they have not given origin to the biggest valleys. The little valley seen to the west of Belmont Castle mentioned above is a case in point and the explanation of this apparent anomaly is not far to seek. From their elevation it is evident that the dissolution of the Chalk and the consequent widening of the fissures occurring there could only have been carried on for a short time after elevation of the land had set in at the close of the High Terrace stage as the upper portions of the fissures would soon be placed above the level of saturation. On the flanks of the little anticline, however, the Chalk strata are carried lower, the Tertiaries being consequently in greater thickness. Here the valleys are much larger, as we should expect, seeing that the fissures, of which they form the surface indication, have always been below the plane of saturation since High Terrace times from which date the erosion of the Chalk by acidic water has been continually carried on. (Fig. 6, p. 367).

There is a question as to the date of the movement bringing up the Chalk at Grays and so forming an anticline, the consideration of which we do not wish to enter into in this part of our paper. It will, therefore, suffice to say that the evidence so far as we have examined it at present tends to show that the movement which caused the crumpling of the Chalk and Tertiary strata was also the movement which elevated the land at the close of the High Terrace stage.

VII. CONCLUSIONS.

The conclusions arrived at in the papers on the Ilford District require a little modification, principally with regard to the High Terrace Drift. In the first of the former papers it was argued that this portion of the Pleistocene period was characterized by a climate of considerable rigour. Undoubtedly there is evidence of the action of river-ice in the deposits of this terrace, but since these deposits have been yielding to us a fauna as rich as that of the brickearths at a certain locality in

Kent, and which we hope to describe shortly, it seems that the view of an exceedingly cold climate is hardly tenable now. The recent physiographical researches of Prof. Davis and Messrs. Buckman and White have also released us from the necessity of invoking rigour in our theories with regard to the High Terrace Drift.

In the main we endorse the conclusions arrived at from the Ilford District in connection with the Middle Terrace. It seems to us that the climate during this portion of the history of the Thames was very similar to that of the present day. The Thames at this time certainly possessed an estuary of its own. There are, however, a number of vexed questions in connection with the Pleistocene strata of the Thames Valley to be settled before any attempts at dogmatising will succeed.

[Part II. of this paper will appear in volume XII.—ED.]

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